





THE NEW PRIMATES' HOUSE.

TOWARD the mammals of all Orders save one, human interest is variable and erratic. The various groups have their separate admirers, and from the elephant to the Spiny Anteater of Australia, there is no mammalian family without its circle of patrons and champions.

But there is one Order which attracts the entire human race, and compels universal attention. The savant and the savage, the prince and the pauper, are moved by a common impulse to meet on common ground before the cages of the Primates. The spectacle of human likeness as displayed by apes, baboons, and

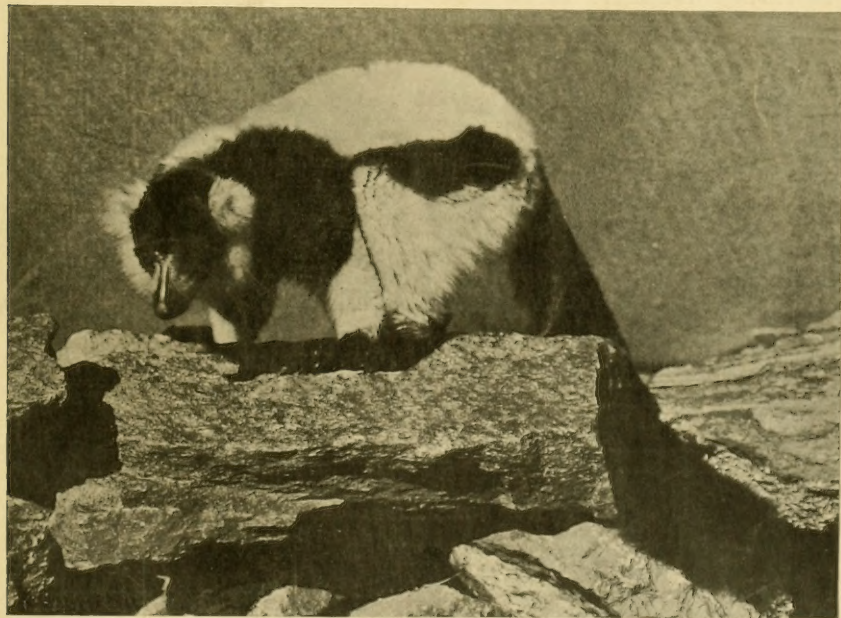
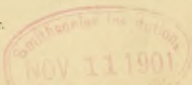


PHOTO BY E. R. SANBORN.

RUFFED LEMUR, *LEMUR VARIA*.

The Zoological Society has recently received six specimens from Madagascar.



As a thoroughly scientific plant for the successful care and satisfactory public exhibition of 250 apes, baboons, monkeys, and lemurs, the Zoological Society believes that it will bear comparison with the best buildings of the kind that have been produced thus far. Moreover, its ground plan, cage designs, and service arrangements are, in nearly every detail, entirely new. These features are the hard-earned results of our own studies of living primates, both in their native jungles and in many phases of captivity.

GENERAL CHARACTER.

Like our other large buildings, the Primates' House is only one story high. Like them also its architectural style is classic, and its materials are buff brick, gray granite, Indiana limestone, gray terra cotta, red slate, and copper. It is 162 feet in length by 74 feet in greatest width, including the outside cages, which have a maximum width of 23 feet. The main building consists of two lofty and spacious halls, joined by a long central gallery. At each end there is a wide entrance pavilion, consisting of a central vestibule, flanked on each side by rooms necessary to the service of the building. All along the eastern front of the building extends a series of lofty outdoor cages.

Although the interior of the main building is divided into three halls, when the wide, interior doors are open, the divisions detract but slightly from the general effect of one grand gallery, 122 feet long, and 43 feet wide. This subdivision of the space is a new idea in animal-house construction, and it gave the keynote for the entire plan. The reasons for it are as follows:

1. More perfect control of interior temperature.
2. The ability to maintain more than one temperature.
3. The scientific subdivision of the primates.
4. The acquisition of a maximum of floor space for animals.

THE HALLS.

The South Hall is to be occupied exclusively by the monkeys of the New World—the capuchins, spider monkeys, sakis, howlers (if they will live), marmosets and owl monkeys. The Main Hall is to be devoted to the baboons, monkeys, and lemurs of the Old World. The North Hall is for the anthropoid apes—orangutans, chimpanzees, and gibbons, and also gorillas, as often as good fortune renders it possible to secure a specimen of that rare and wonderful creature.

THE INTERIOR CAGES.

The interior of the building is provided with cages of four different types. There are two triple wall cages, extra large and light, and four double wall cages, for the great apes, and for large generic groups of South American monkeys. There are nine single wall cages, for baboons and large monkeys. One cage is quite spectacular, being very large, open on four sides, and backed by a jungle of growing plants. This is called the Jungle Cage, and will contain a collection of lemurs and particularly beautiful members of the Genus *Simnopithecus*.

The fourth type consists of 22 floor cages, which, though much smaller than any of the preceding, are yet abundantly large for the shy and delicate species which they will contain. Strange as it may seem, there are many species of mammals which are so timid and so delicate every way, that they are happier, thrive better, and live longer in comparatively small quarters than when given a great amount of space. To a very timid animal, the sense of being protected at all points is as necessary to its health, as good air and sufficient warmth.

The dimensions of the interior cages, not counting their tables, are as follows:

1 Jungle Cage,	21	feet long,	10 feet deep,	and 12 feet high
2 Triple Wall Cages,	10½	"	" 12 "	" " 14 "
4 Double "	8	"	" 12 "	" " 14 "
9 Single "	6½	"	" 12 "	" " 12 "
22 Floor "	3½	"	" 4 "	" " 6 "

Total number of primates provided for, about 250 specimens.



PHOTO BY E. R. SANBORN.

RED-HEADED MANGABEY.



MODELLED CRESTING FOR PRIMATES' HOUSE.

Designed by A. P. Proctor.

The wall cages extend along the eastern wall of the building, in an unbroken series, their floors raised three feet high from the floor of the building. Overhead they extend up to the roof, and each cage is provided with a spacious skylight, which makes its interior a bright and cheerful place of abode. A high window, between the sleeping-boxes, communicates directly with a corresponding outdoor cage, to be used by the animals in hot weather.

The interior of each wall cage will be a small gymnasium, provided with ladders, swings, flying-rings, and horizontal bars so tempting that no sane and healthy primate can resist the temptation to exercise frequently, and thereby keep in good health.

THE OUTDOOR CAGES.

In recognition of the fact that outdoor air is the best thing in the world for a wild animal, provided it be not unendurably cold, the series of outdoor cages form one of the most important features of the Primates' House. They face toward the southeast, extend the entire length of the main building, and on the north, east, and south are sheltered by leafy walls of forest. At each end of the building is a huge, semicircular cage, 23 feet in diameter, and 15 feet high above the floor, each covering the entire end of the corresponding interior hall. The conical roof, of corrugated iron and glass on light steel girders, rests lightly but generously upon the interior, like a Malay hat, and projects two feet beyond the outer wall of wire, giving it a decidedly graceful appearance.

Between these two great end cages extend, like the links of a chain, the series of smaller cages, ranged along the outer wall of the building, and divided to match the cage divisions within. The partitions dividing these cages are half solid wood, for protection against cold north and south draughts, and half wire-netting, for coolness in hot weather, and sociability at all times. All these cage fronts are of wire-netting, except that for the great apes, which is provided with light steel bars.

THE MONKEY GROVE.

An interesting and important outdoor feature, but not to be developed until next year, will be the Monkey Grove. Near the south-eastern corner of the building stands a small grove, containing about a dozen trees from thirty to fifty feet in height. By lopping off a few branches, this grove will be isolated from the adjacent forest. A wire fence, with an unclimbable overhang of smooth metal will be erected around this grove, after which a mid-air tunnel of wire-netting will be run from the large outdoor cage into the tree-tops. It is intended that the larger monkeys of the South Hall shall have, in the seasons of mild weather, free access to and from this grove, and afford visitors an opportunity to observe monkeys actually in a state of nature.

The doors between all the interior and exterior cages are so constructed that the primates can open them at will, and in mild weather go out and come in at pleasure. Each door is hung on sash-weights, so carefully adjusted that a lift of three pounds will raise it, and it drops by its own weight.

WIRE-NETTING INSTEAD OF BARS.

An important innovation in the construction of the cages of this building is the general use of open chain-netting set in channel-iron frames, instead of the heavy upright bars that have been used almost universally hitherto. The only variation from chain-netting is found in the apes' room, where, on account of the strength of the animals, and their cunning and perseverance in destroying wire-netting, bars are considered necessary. While it would be possible to make a wire cage-front that would withstand the attacks of an adult orang or chimpanzee, the size of the wire, and the amount of it necessary, would be so great as to nullify the ordinary advantages of netting.

One advantage of chain-netting which is not to be ignored, is its value as a means of exercise for the monkeys. As an aid in climbing it is unsurpassed, and the joy which monkeys



MODELLED CRESTING FOR PRIMATES' HOUSE.

Designed by A. P. Proctor.

manifest in swinging over large sections of 2-inch mesh No. 13 wire-netting is ocular proof of its value. Quite aside from this, however, its highest value lies in the emancipation of both monkey and visitor from the objectionable prison bars, that for a century have stood between them.

CAGE SERVICE.

The cleaning of mammal cages from the front is not, and never can be, satisfactory. The principle is bad, and its application is worse. The chief obstacle in the way of cage service wholly from the rear lies in the necessity for direct communication, for the animals, between the interior and exterior cages.

Just how this difficulty has been met in the planning of the Lion House will appear in a future number of the Bulletin. In the Monkey House, a Keepers' Passage, 3 feet wide and 7 feet high from the floor of the building, has been constructed between the interior and exterior cages, with doors opening into every cage of both series. Its flat top serves partly as a floor for the interior sleeping-boxes, and partly as a convenient and comfortable shelf for the inmates of the cages, upon which they will show off to excellent advantage. An open space between the sleeping-boxes leads to the window, by which the monkey habitant passes at will from his interior apartments to that in the open air.

The Keepers' Passage is reached from both ends, and also by two cross passages, which lead directly from the floor of the main hall. The latter afford quick and easy access from the interior of the building to every cage, without as well as within. Each service door of the cages is provided with a peep-hole, in order that the keeper may know the whereabouts of his animals before entering.

HEATING, LIGHTING, AND VENTILATION.

Like the Reptile and Bird Houses, the Primates' House is heated by hot water, partly by direct radiation, and partly by registers. The

temperature is regulated automatically by means of a system of thermostats, and will be maintained at 75 degrees Fahrenheit.

The lighting of the building and cages has been very successfully developed, and it is believed will prove admirably adapted both to the wants of the animals and the public. The total area of roof-glass is really very great, and this, with the grand windows in the western front of the building, makes the whole interior as light as could possibly be desired.

The ventilating system for the building and cages has been thought out with special care. A feature of prime importance is the arrangement by which warm air issues from underneath the interior wall cages, is drawn into the cages, and after warming them and becoming vitiated, passes out at the top instead of being thrown into the auditorium. This has been devised for the express purpose of carrying off all wild animal odors without their passage through any portion of the space occupied by visitors.

PLANS AND ARCHITECTURE.

The ground plan and cage arrangements of the Primates' House were designed in 1896 by the Director of the Zoological Park. The architectural work is by Messrs. Heins & La Farge, and the engineering by Mr. H. de B. Parsons. The decorative animal sculptures are from models executed by A. P. Proctor. The terra cotta which forms so prominent a feature of the building's adornment was manufactured by the Atlantic Terra Cotta Company. The contract for the building was let by Hon. August Moebs, Park Commissioner for the Borough of the Bronx, and the work has proceeded under the joint supervision of the Architects and Mr. Martin Schenck, Chief Engineer of the Park Department for Bronx Borough. It is being erected by Thomas Cockerill & Son, who are prosecuting the work in a manner highly satisfactory to the Zoological Society and the Park Department. Work began on February 10, 1901, and has progressed with rapidity and precision. On



PHOTO BY E. H. SANBORN.

THE ORANGS DINING.

Compartment for large apes in Primates' House.

the part of the builders, every effort has been made to meet the numerous special wants inseparable from large permanent buildings for animals.

The total cost of the building is \$64,160, and it is paid from funds provided by the City of

New York. Its live animals will be provided by the Zoological Society. No portion of the cost of the Zoological Park has been met by the State of New York, or otherwise than by private citizens through the Zoological Society, and the municipality of New York.

Red and Gray Squirrels have multiplied surprisingly well in the Park, and numerous are the battles fought, for they are mortal enemies. Frequently when some industrious member of the *Sciuroidea* is busily engaged in garnering the winter's store of nuts, his work is likely to be rudely disturbed by a tiny redskin torment. Away they go, a flash of gray and red, the gray to seek shelter in the top of some lofty shagbark or sweet gum, while little spitfire returns, to confiscate the result of his hard labor.

The editorial on page twenty-five of this issue, reprinted from Bulletin No. V., is worthy of your serious attention. A membership of 3,000 would indeed be a tower of strength, and there must be at least 10,000 good citizens in this great city who could become Annual Members.

THE PARK LIBRARY.

Books for the correct identification of mammals, birds, and reptiles are as necessary as food with which to keep them alive. At this moment the Zoological Park office urgently needs, for daily use, \$5,000 worth of zoological books and periodicals. Now that the Service Building is complete and occupied by the Park officers, it is time for the formation of a library to begin in real earnest. Thus far, the Society's expenditures for books have been limited to about \$1,500; and, in reality, a special Library Fund is one of the needs of the hour.

Incidentally, it may be mentioned that any member of the Society, or friend thereof, who

owns a copy of Audubon's "Birds of North America," which is not in constant use, and which he might see fit to present to the Society, it would constitute a highly acceptable and permanently useful gift.

All members who have in their libraries any works on mammals, birds, and reptiles which are not in frequent use, are invited to remember that gifts of such books will be highly acceptable to the Society.

THE LION HOUSE.

On July 11th a contract for the erection of the Lion House of the Zoological Park was let by the Park Department to Thomas Cockerill & Son, at \$134,500, and work on the excavation began on July 20th. The contract time is 150 working days. The rubble masonry foundations were completed October 15th, and it is a safe prediction that the building will be enclosed by Thanksgiving. This means that by May 1, 1902, the structure will be fully complete and ready for occupancy. In view of the satisfactory manner in which Mr. Cockerill is proceeding with the Primates' House, the Zoological Society is well pleased to have the building of the Lion House also in his hands.

The contract for the four sentinel lions, in marble, and all other animal sculptures on the Lion House, has been awarded to Mr. Eli Harvey, and his models are well advanced.

THE BEAVERS.

Ever since August 1st the Beavers have been busily preparing for winter. They have cut down about ten small trees, barked three large ones for felling in the near future, raised and strengthened their dam, and added much material to their house. The Beaver Pond begins to look like a wreck. Thus far nearly every tree that has been felled has been cut up and fully utilized. Peeled poles, sixteen feet in length, have been placed on the ends of the dam to anchor it firmly to the bank. The dam as a whole has been developed into the form of one side of an ellipse, with the curve up-stream. The water of the pond has been raised about a foot since July 1st. All this is the work of these remarkable animals.

Frequently, late in the afternoon, beavers have been seen carrying mud and placing it on the ends of the dam. During the month

of July, two of the animals came out almost daily, and lay for several hours on an islet in the centre of the pond. Just how well the three Texas beavers will endure the Northern winter remains to be seen. Inasmuch as they are strangers in a strange land, a warm house will be constructed for their use, if they care to take advantage of its hospitality.

On the whole the Beaver Pond appears to deserve a place in the list of successful installations of the Zoological Park, and there is to-day apparently no reason why the inhabitants should not live in good health and breed freely.

Our most recent purchase, seven Newfoundland Caribou, arrived at the Park, October 8th, direct from Bay of Islands. They are fine, plump, healthy little fellows, about as large as a full-grown Newfoundland dog.



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ODIOUS NICKNAMES.

A wise man once recorded the opinion that "a good name is better than precious ointment," and in this view the Zoological Society heartily concurs. "New York Zoological Park" is a good name, but New York Zoological Garden is a bad name, "Bronx Park Zoo" is worse, and "Bronx Zoo" is worst of all. In etymological value, both the latter are inadequate and misleading, and to those who desire fair play for the Zoological Park they are offensive.

To those who have thus far given the subject no special thought, it may be pointed out that in this country the term "Zoo" is, by universal consent, applied to all small and inexpensive collections of living animals, especially those which have not yet risen to the dignity of zoological gardens occupying thirty or forty acres of ground. There are about twenty such establishments. Despite the per-

nicious example of the people of London, no well equipped zoological garden should be called a "zoo," any more than a clipper ship should be called a smack.

A zoological park attempts all the functions of a zoological garden, and many more. To stock its big ranges and outdoor enclosures, about *five times* as many live animals are necessary as suffice for a zoological garden of the first rank. The zoological park idea, carried out to its logical conclusion, means a vast amount of work, worry, and expenditure which zoological garden founders do not encounter. This being the case, the very least that the founders of a first-class zoological park can ask is that the accepted name of the institution shall indicate its scope.

Imperial New York is building up several scientific and artistic institutions of national importance, but wholly without State or National aid. Thus far, with but one exception, the names by which they are known are dignified and distinctive, and recognized all over the civilized world. But fancy one of them being called, in this city, the Central Park Picture Show, another the Manhattan Square Museum, and another the Bronx Park Greenhouses. Yet this, if done, would be quite as fair and appropriate as the use of the ever-odious nickname "Bronx Zoo," when speaking of the New York Zoological Park. If the latter is worth mentioning at all, it is entitled to its name, and the people of New York should, by rights, be the last people on earth to attach to it a nickname which is bound to bring it into contempt and inflict upon it perpetual injury.

It is true that the beautiful location of the Park is in the Department of the Bronx, but it belongs to, represents, and is supported by Greater New York.

Not long since an appeal was made to the press of New York City in behalf of "Zoological Park," and against all localized nicknames. It is a pleasure to be able to state that, without a single exception, the Society's request was received with courteous and serious consideration. Since that date the nicknames have almost entirely disappeared from the columns of New York newspapers. This is also true

of many newspapers published in other cities in whose columns the progress of the New York Zoological Park has been followed.

Regarding our name and place, the world outside of New York will take its cue from this city. If we are to be dubbed Bronx Park Zoo the world will hold us cheaply, at a Bronx-Zoo estimate, to the end of time; and to this fact the attention of all members of the Zoological Society is specially invited.

NEW MEMBERS.

It requires a great membership as well as a great many animals to make a fine Zoological Park. Even the finest of raw materials require workmen and the sinews of war for the production of the finished product.

In creating a Zoological Park the first and most important requisite is public support in the form of membership.

Thus far the New York Zoological Society has carried out its programme without a single long delay. Regarding the Society's membership, there is but one thing to be done—namely, to raise it to 3,000. Of Annual Members there are 852, and the other sustaining members of all classes bring the total active list up to 1,061 persons.

But for one thing this could be considered a high figure. If the Zoological Park and the general work of the Society is to be developed on the broad and liberal lines laid down five years ago—and faithfully followed up to this date—a membership of 3,000 sustaining members is an absolute necessity.

The Society is pledged to provide all the animal collections of the Zoological Park, and ere long this will mean an annual expenditure of not less than \$20,000. An Administration Building, with a fine library, picture gallery, and reception rooms open to members must be provided by the Society for the prosecution of its scientific work in the Park. The Society desires to issue, from time to time, important natural history publications for the special benefit of its members. It also wishes to promote research in certain lines, and enter more actively into the business of affording better legal protection to our native animals.

Two thousand new annual members, contributing \$10 per year, are needed. As a source of strength, the importance of the Annual Member can hardly be overestimated. With 3,000 men and women, contributing regularly \$30,000 per year, every object that the Society is now planning can be accomplished. The

greater the number of members, the greater will be the advantages of membership to each. Because of all this, the friends of the Society are again invited to interest their friends to become Annual Members without delay. Applications may be sent direct to the Secretary, Madison Grant, 11 Wall Street, or handed in at the Director's Office in the Service Building of the Zoological Park.

AN OBJECT LESSON.

In response to our appeal in the previous BULLETIN in behalf of a Library Fund, Miss Caroline Phelps Stokes kindly forwarded her check for \$300, with the request that its expenditure should be chiefly for books which might be of practical use to the Department of Birds. Acting on the principle that the most important gaps should be first filled, the following works were purchased with this gift and added to our library nucleus:

- Parrots in Captivity (Greene).
- Birds of British India.
- Birds of the Japanese Empire (Seeböhm).
- Plovers and Sandpipers (Seeböhm).
- Birds of Celebes.
- Book of Canaries and Cage-birds.
- History of Birds of New Zealand, 2 vols. (Buller).
- Birds of India, 3 vols. (Jerdon).
- Illustrated Manual of British Birds (Saunders).
- Handbook of Birds of Australia, 2 vols. (Gould).
- Argentine Ornithology, 2 vols. (Sclater).
- Handbook of Birds of British Burma, 2 vols. (Oates).
- Review of Recent Attempts to Classify Birds (Sharpe).
- Birds of the West Indies (Cory).
- Cambridge Natural History, "Birds."
- Manual of the Birds of New Zealand (Buller).
- Untersuchungen zur Morphologie und Systematik d. Vögel (Fürbringer).
- Birds of Siberia (Seeböhm).
- British Cage-birds (Wallace).
- Veterinary Pathology (Friedberger and Fröhner).
- Die Krankheiten des Hausgeflügels (Zurn).

It takes a mountain of books to cover the vertebrate fauna of the world. Who will be next to help along the library? There are many costly mammal books that are sorely needed at this time.

REPORT ON THE DESTRUCTION OF BIRDS AND MAMMALS.

The numerous requests from teachers and game protectors for copies of Mr. Hornaday's Report on the Destruction of our Birds and Mammals, as reprinted from the Second Annual Report of the Zoological Society, has made necessary the printing of a new edition of three thousand copies. The detailed statements of the various observers have been omitted. Copies will be furnished to teachers and to all other persons desiring to make use of this document in promoting the better protection of our birds and mammals, upon receipt of a 2-cent stamp for each copy desired. Address the Director of the Zoological Park.



PHOTO BY E. R. GANDORN.

CHIMPANZEE "ZONGO."

Male, three years of age.

THE PRIMATE COLLECTION.

The new Primates' House will open with a collection for which there will be no occasion to apologize. Already it contains a total of 34 species, represented by 103 specimens, and between this date and the opening day important additions will be made.

The great apes have already been mentioned. The baboons are represented by a very good male *Hamadryas*, three Black Apes (two species), a pair of big olive and black East African Baboons, representing a species but recently discovered (*Papio*), a pair of long-armed Golden Baboons, and two *Chacmas*. Of all these, the *Hamadryas* is the most imposing, chiefly by reason of the mantle of long gray hair which covers the shoulders, and the long side-whiskers which thrust out horizontally from the cheeks.

The Asiatic Monkeys are represented by the common Macaque, the Rhesus Monkey, Bonnet Macaque, two female Lion-Tailed Monkeys (rare), the Japanese Red-Faced Monkey—able to live outdoors in winter—Pig-Tailed Macaque, and other species.

Of the African long-tailed monkeys, the following important species are represented

by from one to four specimens each: Moustache Monkey, Hocheur or White-Nosed Monkey, Green Monkey, Patas, Vervet, Collared Mangabey, Sooty Mangabey, and Mona.

Of American Monkeys the Sapajou group is well represented, five species being shown. The Howlers and Sakis are at present entirely wanting and greatly desired, although thus far we believe it has been a practical impossibility to induce Howlers to survive in a zoological garden or park. The *Ateles* group is represented by a particularly fine Black Spider Monkey; and a cageful of Squirrel Monkeys or Common Marmosets completes the series of true monkeys.

In Lemurs the collection is particularly rich. There are twenty-two specimens altogether, six of which are of the beautiful black and white species known as *Lemur varia*. Excepting the *Indri*, this is the most showy of all the lemurs, and their active habits and inoffensive tempers render them very desirable animals to have in a collection. There are 2 Ring-Tailed Lemurs, 2 Gray, 2 Mongoose, 1 Musteline, 2 Yellow-Headed, 1 White-Faced, and 1 Galago.

In addition to the species already in hand, the number necessary to represent the most important of the remaining groups of Primates is not exceedingly large. Thus far, and even with the handicap of temporary quarters, the mortality among our primates has been surprisingly low. There have been but two cases of tuberculosis. With the advantages that will be afforded by the new building it is hoped that the longevity of our four-handed folk will justify the Zoological Society in the expenditure of considerable sums of money in acquiring a large number of rare and valuable forms.

A short time ago, the water in the Beaver Pond suddenly lowered, thereby alarming the occupants most decidedly. Evidently not discovering any error in the engineering of the dam, they adjourned to the outlet of the stream, in the iron and concrete enclosure, about twenty feet below. Here they fell at work thrusting sticks between the bars and plastering the openings with mud in the endeavor to stop the leakage. At this time they have made considerable progress and the end is not yet.

THE ALASKAN EXPEDITION.

The subject of an interesting article in the next issue of the "Bulletin," will be the Society's Alaskan Expedition. It will be treated as a narrative of events, richly illustrated with views of the beautiful mountain scenery and the white sheep in their native haunts.

The sheep installation already comprises five fine specimens, two Sardinian Mouflon, two Aoudad and one Himalayan Tahr.



PHOTO BY E. R. SANDORF

ORANG "RAJAH."

OUR GREAT APES.

The Zoological Park has been quite fortunate in the acquisition of anthropoid apes, and the Apes' Hall in the new Primates' House will be opened with five specimens.

The latest arrival, who was literally received with open arms, is an uncommonly fine, lusty, and handsome male chimpanzee, three years old, brought over by Carl Hagenbeck himself on the *Pennsylvania* on September 12th. It is probably as fine a specimen of its age as ever came into captivity, and shows all the points of a thoroughbred—round face, full chest, broad shoulders, clear white skin, and black hair. In comparison with other chimpanzees that have been seen in America, it most nearly resembles Chico, who for about a year was exhibited at the Central Park Menagerie.

The new arrival has been christened Zongo, which is the name of a native tribe inhabiting his country in the Congo Basin, West Africa. At present he is 28 inches in height, weighs

23 pounds, and the extent of his arms between finger-tips is 36 inches. He is strong and boisterous in manner, yet very affectionate toward his keepers. Just at present he has no use for any of the "Orangs," but undoubtedly will consent to become acquainted with Rajah within a reasonable time. He arrived at the Park with a cold in his head, but it soon disappeared.

Zongo's food is the same as that of the "Orangs"—boiled rice, tapioca, and oatmeal, served with warm milk: boiled sweet potatoes, bananas, a moderate amount of stale bread, and occasionally an egg.

The four Orang-Utans are in fine health, and were greatly benefited by their outdoor life during the past summer. Instead of being coddled, they are treated to plenty of fresh air and given every opportunity to exercise. After several severe illnesses, due to troubles with her digestive organs, little long-haired "Sally," the only female of the Orang family, has finally become quite well and vigorous, and is growing as a healthy child should. She has now been two years in the Park. On account of her illnesses, she has been a little spoiled by attention, and is inclined to be contrary under training.

Rajah is the largest and finest of the Orangs, and a more perfect simian it would be difficult to find. Judged by the standards for his species, he is a handsome and finely developed animal. His temper and disposition could hardly be improved upon. He is kind and affectionate, utterly devoid of fear and suspicion, and a Mark Tapley in cheerfulness. Under the training of Mr. Ditmars and Keepers Munzie and Miles, he has been quick to learn, ready to do his part, and patient beyond all expectation. In fact, Rajah is a dignified gentleman (for, be it remembered, "orang" is Malay for "man"), and already has a reputation to sustain.

During the warm months he was dressed daily at 5 p.m. in citizen's clothes, and given his meal at a table on a high platform over the outdoor cages of the orangs, where all visitors to the Park might see him. Daily he donned his trousers, shirt, belt, necktie, and coat, with never a protest, climbed up to his chair and seated himself. His rice and milk he ate with a spoon, for his sliced bananas he used a fork, then drank milk from a cup, and beef-tea from a bottle. Not once did he spoil the exhibition, and the benign manner in which he would occasionally look down upon the admiring and laughing crowd was exceedingly droll.

Brunei, Rajah's special partner, is a trifle smaller than his mate, but equally strong and



PHOTO BY E. R. SANBORN.

A YOUNG PIG-TAILED MACAQUE.

vigorous. His countenance is not so handsome as that of his rival, and his hair, which became much worn during his captivity in the Far East, is still short and scanty. He is quite wilful in disposition, even to contrariness, and takes his training rather grudgingly. When prevented by force from following out his inclinations he frequently threatens to bite.

The fourth member of the Orang family, little Sultan, is, in the terms of the track, "a dark horse." At present, with his big, round head, *small mouth*, protruding stomach, and no hair to speak of, to look at him is to smile. But Sultan is a thoroughbred, and Rajah's understudy. He is very intelligent, very tractable, learns quickly, and goes through his table performance with the steadiness of a clock. When a flashlight sends Sally in a wild leap across the table into Rajah's arms, little Sultan sits in his place, spoon in mouth, all unmoved. If he lives he will become famous.

In all probability the next anthropoid ape species to be added to the collection will be the gibbon; and, next year the Society hopes to secure a gorilla.



PHOTO BY E. R. SANBORN.

BLACK SPIDER MONKEY.

Fully 500 garter snakes have been born in the Reptile House, the past summer. Most of them have been liberated in the vicinity of the small ponds to maintain the species.

RECENT ARRIVALS.

MAMMALS.

Gifts.—1 Squirrel Monkey, R. H. Titherington; 1 White-throated Capuchin, Mrs. J. Sterling; 1 Puma, Joseph P. Grace; 1 Coyote, 1 Gray Fox, 1 Ring-tailed Cat, 1 Ferret and 1 Badger, Chas. Sheldon; 3 Red Foxes, William V. Russ; 2 Raccoons, S. F. Howes; 1 Gray Fox, H. J. Meyers; 3 Raccoons, George H. Hamlin; 2 Sardinian Mouflon, Maurice Egerton (London); 2 Fox Squirrels, Ivan H. Rowe; 1 Brazilian Porcupine, H. S. Williams; 1 Albino Woodchuck, Richard Norton.

Purchases.—1 Chimpanzee; 2 Orang-Utans; 1 Hamadryas Baboon; 2 Long-armed Baboons; 2 Abyssinian Baboons; 2 Black Apes; 1 Red-headed Mangabey; 6 Sooty Mangabeys; 1 Collared Mangabey; 2 Lion-tailed Monkeys; 2 Gray Spider Monkeys; 1 Mona Monkey; 6 Green Monkeys; 2 White-nosed Monkeys; 1 Moustache Monkey; 2 Patas Monkeys; 1 Vervet Monkey; 1 Rhesus Monkey; 2 Brown Capuchins; 1 Bonneted Macaque; 3 Japanese Macaques; 4 Pig-tailed Macaques; 1 Common Macaque; 22 Lemurs, comprising the Ruffed, Ring-tailed, Gray, Mongoose, and Yellow-headed lemurs; 1 Galago; 1 Leopard; 2 Lynx; 1 Alaskan Grizzly cub; 1 Alaskan Brown Bear cub; 1 Japanese Bear; 2 Korean Bears; 2 Sun Bears; 1 Himalayan Tahr; 1 pair Aouda,

or Barbary Wild Sheep; 2 Sambar Deer; 1 Pekin Sika Deer; 1 Chinese Water Deer; 1 Anoa; 1 Elk Fawn; 2 Collared Peccaries; 3 Prevost's Squirrels; 2 Agouti; 4 Hutia.

BIRDS.

Gifts.—40 young native birds, comprising Tanagers, Kingfishers, Blue Jays, Blackbirds, Thrushes, etc., collected by the Bird Department; 1 Crossbill, 1 Horned Owl, C. W. Adams; 1 White-fronted Amazon Parrot, Mrs. L. E. Palmer; 2 Tovi Parakeets, Mrs. L. D. Hurd; 1 Orange-winged Amazon Parrot, Miss M. Schrader; 4 Western Red-tailed Hawks, Charles Sheldon; 2 Red-shouldered Hawks, E. Meyenberg; 2 Banded Fruit Pigeons, Mason Mitchell; 1 Crested Curassow, 1 Guan, Homer Davenport; 2 young Herring Gulls, Mr. and Mrs. Frederick Longfellow.

Purchases.—15 African Weaver Birds, comprising Cutthroats, Zebras and Waxbills; 2 Paradise Widow Birds; 4 Bobolinks; 1 Troupial; 5 young Ravens; 1 Lemon-crested Cockatoo; 1 pair of Mongolian Pheasants; 2 Chinese Painted Quail; 2 German Quail; 1 Whooping Crane; 4 Demoiselle Cranes; 3 Great Blue Herons; 10 Louisiana Herons; 2 Yellow-crowned Night Herons; 3 White Ibises; 4 Roseate Spoonbills.

REPTILES.

Gifts.—2 Cuban Crocodiles, Capt. A. G. Hammond; 1 Alligator, Dr. J. V. Lauderdale, Jr.; 1 Musk and 2 Snapping Turtles, Masters Tony and Otto Dempewolf; 1 large West Indian Iguana, A. Van Winkle; 21 spec. Skinks, Newts and Swifts, Mr. and Mrs. Charles Tunison; 2 Banded Rattlesnakes, 2 Copperheads, Buffalo Park Commissioners; 1 Texas Rattlesnake, 1 Marcy's Garter Snake, 1 Texas Hog-nosed Snake and 10 Horned Toads, Philadelphia Zoological Garden; 1 Gila Monster, 1 Banded Rattlesnake, Dr. G. Langmann; 5 Texas Rattlesnakes with 13 young, and 8 other specimens of various kinds, E. Meyenberg; 1 Cane-brake Rattlesnake, Emmet G. Charlton; 183 specimens, comprising 10 species of our common snakes; 39 Newts, Miss Eugenie A. Kruesi; collection of Salamanders and Terrarium, August Hitzel.

Purchases.—5 Galapagos Tortoises, comprising 3 species; 1 Alligator Terrapin, weighing 100 lbs.; 1 large Abyssinian Tortoise; 2 Nubian Tortoises; 10 Texas Swifts; 10 Horned Toads; 1 large Monitor; 27 specimens from North Carolina, comprising Water Snakes, Corn Snakes, etc.; 1 Giant Salamander.

THE RACCOON TREE.

A permanent installation for Raccoons has been established near the southern end of the Bear Dens, where its inmates will be near their plantigrade relatives. At the foot of the steps leading down from the Rocking Stone, a thrifty cedar-tree, forty feet in height, has been enclosed by an elliptical iron fence provided with a sheet-metal overhang which is not negotiable by any Procyon. Inside the fence is a dry yard, a pool of water for all purposes, and the trunk of the tree is surrounded by a rustic shelter house, divided into ten warm and dry compartments. Underneath the house is a clean and smooth wooden floor, on which the food is served.

The smooth, horizontal limbs of a cedar-tree are grateful and comforting to a dozing

raccoon, and the tree is not so high that the animals can climb beyond the visual power of the visitor. By a wise provision of Nature, three-fourths of the green branches of this particular tree are on the western side, where they form a welcome wind-break in winter and sun-shade in summer.



PHOTO BY E. H. SANBORN

THE RACCOONS' TREE.

Recently enclosed near the Bear Dens.

GENERAL INFORMATION.

ADMISSION.—On all holidays and on Sunday, Tuesday, Wednesday, Friday, and Saturday, admission to the Zoological Park is free.

On every Monday and Thursday, save when either of those days falls on a holiday, only members of the Society, and persons holding tickets from the Society, are admitted free. All others pay twenty-five cents for each adult, and fifteen cents for each child under twelve years of age. Tickets are sold only at the entrances.

OPENING AND CLOSING.—From May 1st to November 1st, the entrance-gates will be opened at 9 A.M. and closed half an hour before sunset. From November 1st to May 1st the gates will open at 10 A.M.

BICYCLES must be checked at the entrances (five cents). All wheels not called for half an hour before sunset will be locked up until the following day.

RESTAURANT.—At the Rocking Stone Restaurant meals are served à la carte every day from 10 A.M. to the closing hour.

In the North Pavilion of this building is a spacious lunch counter, where all kinds of luncheon food are served at popular prices.

The Reptile House Lunch Room has been closed.



PHOTO BY E. R. SANBORN.

AN ANIMAL SCULPTOR AND HIS MODEL

Mr. A. P. Proctor modelling the "Orang Utan" Rajah, as one of the figures for a pediment group on the Primates' House.

Notes.

The "Service Building" is at last completed, and all departments are safely housed and settled down for the winter's work. After so long in cramped quarters, it takes a deal of stretching for the officers of the Park to get accustomed to such a spacious, airy abode.

An Alligator Snapping Turtle, purchased in Plaquemine, Louisiana, is a formidable rival to the smallest Giant Tortoise. He weighs 90 pounds and his head measures fully 25 inches in circumference.

The largest alligator, "Mose," was successfully treated for a tumor-like growth on the front feet. He was with some difficulty strapped to a board, or stretcher, and the tumors removed by cutting. Injections of cocaine were administered frequently, to reduce the pain as much as possible, and it is reasonable to suppose that he suffered but little.

A beautiful Leopard, which was one of the steamer Afridi shipment, had on its arrival a severe skin disease about the head and ears. Unusually docile, it took so kindly to treatment that the infection has entirely disappeared and a beautiful coat of hair now covers the once bare spots. It gives promise of being one of our finest cats.

In some mysterious manner, a Brown Capuchin Monkey broke its arm, above the elbow. The fracture was successfully reduced and placed in a plaster-of-Paris bandage. To prevent him from removing the bandage, which he did at first, a collar of wood, ten inches in diameter, was placed about his neck. This accomplished the desired result and he has entirely recovered the use of the arm.

The aggregate weight of the five Galapagos Tortoises, which were acquired by the Society July 16th, is about 800 pounds, and the largest specimen of the group weighs nearly one-half of that amount. There are three species represented in this installation.

A fine macadam walk has been completed along the foot of Mountain Sheep Hill, and all the posts are set, ready for the wire enclosure. The rock-workers have completed the first of the series of shelter houses, which is now occupied by a fine pair of Aoudad, or African Wild Sheep, from Morocco. It has been so constructed as to form part of the hill itself, and constitutes a landscape feature which is very imposing.

The "beaver" have worked most vigorously for the past two months. The dam has been increased in height and strengthened until the water has submerged most of the small islands and deepened at least one foot. Trees eight inches in diameter have been laid low and the branches lopped off and used in the "dam" and "house." Along the southeast bank, the birch and maple saplings have been almost completely wiped out.

To one of a number of Rattlesnakes which were purchased in Pecos City, Texas, were born thirteen young, while en route. The brood came to the Park safely and was received with much pleasure.

In addition to the above, fourteen young Diamond Backs were born in the Reptile House. Each snake at birth was encased in a membranous sack, which it broke through of its own volition and commenced moving about, in the liveliest manner. As the Rattlesnake collections are very difficult to maintain, the two additions are most welcome.

The two little European Brown Bears, Czar and Czarina, which came to us on May 25, 1901, have quite won the hearts of all visitors, with their affectionate dispositions and funny little bear ways.

Bears of this species, *Ursus arctos*, are noted for their tractability, and the readiness with which they learn and perform amusing tricks. The unfortunate creatures which are dragged about the world by gypsies, and made to dance, are of this species.

Czar and Czarina are now being trained by Keeper Hoey to wear harness, and draw a sulky, and they take to the bridle and bit quite as patiently as the average colt. When first "hitched up" and driven, Czar complained loudly at being compelled to labor, but he has now become resigned to the inevitable.

In July, 1900, Herr Carl Hagenbeck, of Hamburg, foremost of all collectors of living wild animals for exhibition, sent to Mongolia an expedition for the capture of specimens of comparatively rare species of wild horse, known as *Equus przewalskii*. The latest news from the expedition announces the capture of 46 colts, 24 being males and 22 females. Mr. Hagenbeck states that in capturing these shy and swift animals, his people engaged the assistance of seven big troops of Kirghiz horsemen, numbering nearly 2,000 men, mounted on swift horses. In addition to this formidable army of rough riders it was necessary to take along a great number of brood mares, to be used as foster mothers, one for each of the young wild horses.

In emerging from Mongolia, the expedition will be obliged to make a journey of more than two months, through very rough country, before reaching the nearest station of the Central-Siberian Railway, after which it will require a journey by rail of 2,795 miles to bring the expedition to Hamburg. The entire catch is for sale, and already orders have been taken for 10 stallions and 12 mares, at the rate of \$2,500 per pair.

The black spider-monkey whose picture is reproduced in this number, while not calling for special comment, deserves at least passing notice. No other ape or monkey in the Park, not excepting even Rajah, can boast of such a mild and sunny disposition. For this reason she has become the guardian spirit of all the forlorn and homesick monkeys which occasionally come to the Park. Upon arrival, if they do not seem to find congenial companionship with others of their kind, they are immediately transferred to a separate cage and put under Mary's protecting care, where they may bask in the sunshine of her amiable nature. Just at this time she is nursing a small lion-tail, who has lost his mate and he is rapidly recovering his cheerful disposition, due, no doubt, to this singular characteristic which Nature has given her. She has already proven herself invaluable in this way.

A SPIDER MONKEY IN THE NORTH.

Quite recently it came to my knowledge that Mr. A. E. McCall, of Bath, N. Y., editor and proprietor of the *Bath Plaindealer*, had in his possession a black Spider Monkey (*Ateles ater*) which he had kept in captivity for eleven years. The astonishing longevity of this animal in a northern climate prompted me to communicate with Mr. McCall, and request a detailed statement of history and habits of the animal. Usually, Spider Monkeys are difficult to keep in confinement for any length of time, even in the best zoological gardens. In response to my inquiry, Mr. McCall very kindly furnished the Society a statement which is of decided interest and value to all persons who keep monkeys in captivity, and it is published herewith, entire.—EDITOR.

"The first winter we had Jess, he seemed very susceptible to colds, so I placed a lung pad on his chest, or had him wear a knitted shirt. I also gave him liberal portions of milk-punch, and sometimes the whiskey clear. An important task was to induce him to eat the foods of civilization, especially meats,—even raw beef and fats,—and hot soups, tea, coffee, and chocolate.

"He soon became willing to eat anything that I would, with one exception—'Limburger cheese.' It was quite laughable to watch his actions when I first offered him that delicacy. He smelled it doubtfully, threw it down, and then with a very funny expression smelled of the hand that had held the cheese.

"He became very fond of raw oysters, clams, and sardines. I have always given him a variety. He will eat the largest amount when allowed to sit at our table and be fed, or when some one is eating near him. He takes his largest meal at night, and if he stays up late usually wishes a lunch before retiring. His menu just now is, for breakfast, a cup of coffee and sometimes one or two buckwheat cakes, and at noon a luncheon of bread and butter, celery, lettuce, or something green, with pie, or some other dessert. Invariably he eats the dessert first. At night his meal consists of meat and potatoes or other vegetables, and a cup of tea. It varies, however, as usually I bring him food from the table. Several times each week I give him bananas, of which I think he is more fond than any other thing. He will eat olives, and just as this is being written he sits by me eating a codfish ball.

"Jess is now between twelve and thirteen years old. Possibly the most important factor in the longevity of Jess has been the exercise and diversions he has been allowed to have. I believe that the close confinement of wild ani-



"JESS."

mals in hot, stuffy cages, is enough to kill all save the strongest in a short time. I think there is more danger from hot, impure air than from cold air.

"Before Jess reached maturity I used to allow him to run outdoors like a dog. He would go out from the office or house and make calls, quite independently. Sometimes he would return of his own accord, and again I would be obliged to go after him. Many times I have caught him roaming and told him to go home, and he has gone without my going with him. Frequently he makes the trip from the house to my office, a distance of several blocks. Once he made the trip from the office to the house when the thermometer was down to zero, but the result was that he froze all of his toes! I doctored him diligently, however, and finally brought him round, so that he has had no serious trouble from this chilly experience.

"Since he developed, and his canine teeth came in, I have not allowed him to run at large. In the winter I take him to my office, and when I am in allow him to have the run of the place. At night, and also when I am out, I put him in the cellar, and if he feels cold he will get on top of the furnace or on the pipes.

"In spring, as the weather becomes moderately warm, I take him to my house and chain him outdoors. Usually once or twice a day I let him loose, to run about or climb on the trees. During several seasons I have taken him to a little lake situated a mile or so from the village, which is quite a resort, and I have a kennel for him and fasten him with a long rope, so that he can climb a tree. I also let him have a run quite often. As a result of keeping him out so, he has a long heavy coat of fur. During the summer I frequently give him a good bath, and occasionally also in winter.

"I have often taken him camping out, to ride on cars and steamboats, and he has visited all circuses that have showed here since I have had him. At the shows he pays no attention to the other monkeys, but takes considerable interest in the elephants, lions, and other large animals. Of these he manifests not a particle of fear. Curiously enough, he seems to have no fear of animate creatures, but easily becomes frightened at little toy representations of animals. He has had various pets to play with, such as kittens,



PHOTO BY E. R. SANDORN.

THE SERVICE BUILDING.

Contains all the executive departments of the "Park."

foxes, an opossum, dogs, etc., and at present he has a raccoon and a rabbit. All these, however, admit his supremacy, and he is always the master.

"Jess has had several experiences, aside from freezing his toes. Once a man struck him with a club, breaking his arm. I splintered it up the best I knew how, put it in a sling, and the fracture healed successfully. On another occasion, Jess grabbed a bottle of ammonia and swallowed a quantity. It nearly turned him inside out, but in a few days he came around all right. Once or twice he acted as if he had taken a dose of poison, but by applying the usual remedies, we brought him round. Once he had a stoppage of the bowels, and his condition became very serious. I tried injections and other remedies, without avail, and had about given him up, when I induced him to eat some ripe bananas. This resulted in his recovery. He will readily take homeopathic pills. For ordinary ailments I give them to him, and they seem to produce good results."

THE PUMA.

The Society is now the fortunate possessor of a beautiful young Puma, nearly two-thirds grown. For docility and playfulness of disposition it could scarcely be excelled by any domestic cat in the world. His pelage is a most beautiful fawn-gray, in absolutely perfect condition; the muzzle is marked in the usual manner, by two snow-white spots, which are made singularly striking by two velvety-black ones, immediately behind them; and his eyes, a deep

brown or black, as yet do not show that fire and restlessness which are usually apparent in most captive cats.

Toward his keeper he exhibits the utmost friendliness, and to see him raise his back to a stroke of the hand and express his pleasure by a very loud purr, reminds one forcibly of the hearth-side pet. For a long time the colored peccaries which were quartered near, caused him a great deal of anxiety, and it was apparent that a toothsome bit of wild-pig would not go amiss. However, a tarpaulin suspended between the two enclosures easily remedied the difficulty. His favorite position, which he takes regularly, just before sundown, is reclining in the limbs of an old tree, lying on its side in the cage. Silhouetted against the back-ground of his sleeping den he makes a decidedly striking and picturesque appearance.

He is the first of his kind to be included in the Zoological Park's collections, and has been installed in the Mountain Lions' Cage.

Great numbers of the smaller tortoises indigenous to the soil, have been transferred to the low ground about the Mammals' Pond, and visitors occasionally come upon a solitary member, ponderously travelling.

A VALUABLE GIFT.

Three fine beavers arrived the third week of October, from Maine, the gift of Mr. Hugh J. Chisholm of this city. Altogether this is five from the same source. The value of the gift can scarcely be too highly estimated and their advent will give material assistance to the little colony now preparing for winter in the Beaver Pond.

The lunch room of the Rocking Stone Restaurant has been transferred for the winter to the basement of the east wing of that building.

ZOOLOGICAL SOCIETY BULLETIN

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THE MUSK-OX.

FORTUNATELY for all those who are interested in wild animal life, it now seems fairly established that *Ovibos moschatus* can live and be comfortable in the temperate zone. Our specimen is now two years and six months old, and there is not an animal in the Park more comfortable or more contented than she. The present cool summer, however, is very much in her favor.

Although well known for much more than a century, the Musk-Ox has been one of the very last of the world's large land mammals

to be brought into captivity. This has been due to two causes—the difficulty of transporting the animals from the far North to civilization, and the universal doubt regarding their ability to survive in the temperate zone.

Even under the most favorable conditions, the cost of capturing one of these animals, and bringing it alive to civilization, is really great, and no arctic explorer or whaler cares to experiment with a live Musk-Ox for his own amusement. On the other hand, no zoological garden desires to pay \$1,600 for a live



PHOTO BY E. R. SANBURN

MUSK OX.
GIFT OF HON. WILLIAM C. WATKINS

OCT 7 1902

animal, unless there is a fair chance that it can live a reasonable length of time. For half a century, zoological gardens have been desirous of settling, without too great expense, the much-debated question—can the Musk-Ox survive in the temperate zone?

At Lady Franklin Bay, General Greely's party captured the first calves ever taken alive and kept in captivity; but conditions rendered it impossible to keep them alive for more than a very brief period. In March, 1898, Mr. C. J. Jones made a trip to the Barren Grounds for the sole purpose of collecting and bringing out a number of calves. Five head were actually caught, and driven two days' journey southward. During that time, Mr. Jones and his solitary white companion, George Rea, fought the hordes of fierce wolves which beset them, until utterly exhausted. At last, when the wolves had been left behind, and the two hunters finally slept for a few brief hours, a party of Indians stole up, and with their knives murdered all five of the calves—in order that all the other Musk-Ox of the Barren Grounds should not follow them out of the country!

On August 16th, 1899, the Swedish arctic expedition on the east coast of Greenland captured two male Musk-Ox calves, on Clavering Island (Lat. 74° N.). Both those animals survived. One is now in the park of the Duke of Bedford, at Woburn Abbey, England, the other is in the Berlin Zoological Garden, and both are doing well. These specimens were the first to reach civilization alive.

In March, 1901, Captain H. H. Bodfish sent out from the Whaling Steamer *Beluga*, then wintering in the Arctic Ocean, north of Great Bear Lake, a party of whalers and Eskimo hunters, for the purpose of capturing live Musk-Ox. About 30 miles from the coast the party encountered a herd containing four calves, all four of which were finally captured. Unfortunately, however, two of the calves were soon killed by the savage sled-dogs. The two remaining animals were harnessed to sleds, and driven back to the ship.

In a short time, a third calf was killed by the dogs, leaving only one specimen, a female about one year old. This was successfully

preserved, fed on willow twigs and coarse grass from the Barren Grounds, and finally brought to San Francisco. As soon as civilized hay became procurable, she began to eat it with relish, and her former diet of willow twigs was forever discontinued.

On reaching San Francisco, the little Musk-Ox was offered for sale at \$3,000, and if the Western Union Telegraph Company did not declare an extra dividend because of the Musk-Ox telegrams that went hurtling to and fro across continents and under seas, it was not the fault of the senders. Eventually it came to pass that the animal was brought to New York, and offered to the Society for \$1,600. The opportunity was reported to Hon. William C. Whitney, who immediately purchased the specimen, and presented it to the Society.

This animal is the greatest prize which thus far has entered the Zoological Park. At the time of her arrival, March 12, 1902, she was 22 months old, and her measurements were as follows:

Length of head and body....	4 feet 10 inches
Height at shoulders.....	3 " 2 "
Height at middle of back....	2 " 11 "
Height at hips.....	3 " 1 "
Length of horns on curve....	10 "

Her horns were six inches apart at the base, and this space was filled by a mass of woolly gray hair, like the frontal band which characterizes *Ovibos wardi*. Eventually, however, the horns will grow together at the base until they meet in the center of the forehead.

"Olive" is very comfortably—even luxuriously—quartered in the most northern enclosure of Mountain Sheep Hill, where she has level, grassy earth, a rocky hill, abundant shade, and a subterranean den that is cool in summer. On very hot days, its atmosphere is still further reduced in temperature by big blocks of ice. She is very comfortable, and in perfect health. Her food consists of clover hay, crushed oats, green vegetables, and fresh grass from which green clover is carefully excluded. She has browsed down nearly all the bushes that originally grew in her enclosure.

In temper she is docile, but stubborn, and

when an attempt is made to drive her, she resolutely faces the source of the trouble, lowers her head, and stands still. Her cry is a very ox-like, deep-bass bawl, and externally there is not one feature about her which suggests a relationship to the genus *Ovis*.

W. T. H.



PHOTO BY E. R. SANDORN

MEXICAN JABIRU.

RARE BIRDS IN THE ZOOLOGICAL PARK.

BY C. WILLIAM BEERE.

THE word *rare* as applied to birds has a very elastic significance. A naturalist understands by this term, any species of which comparatively few individuals exist, or one which has wandered beyond the usual territory which it inhabits. In Zoological Park phraseology it might be applied to a bird whose habitat is difficult of access, or which is especially hard to provide with proper food or to keep alive in captivity; while to the public, any

bird is "rare" which is odd-looking and from some distant part of the world.

There are several birds in the Zoological Park collections which merit the title from all three points of view.

One claims first place on the list, for he makes himself so prominent in his large range in Bird Valley that no one can overlook him. He is the American Jabiru, a species of stork, and a very unusual bird in collections. This is probably the most comical looking bird in the Park, even going ahead of the wood ibis, which until the Jabiru's arrival, held undisputed sway as the greatest idiot of the collection. An immense, upturned bill protrudes from a head bare of feathers, but with a tuft of hair-like down on top, which, standing upright, gives the bird a continually surprised expression.

His long neck is naked, partly black and partly flesh-colored. His body feathers are a dirty white, although giving promise of becoming immaculate at some future time, and he walks, or rather totters, on a pair of very long legs, the management of which is a great perplexity to him. He is at his best—or worst—at meal times, when he seizes whole fish, a foot in length, gulps them entire, smacks his bill and squeals with delight. He has a way of shaking them down his throat by jerking his head and beak sideways, but it looks exactly like a person who is saying, "My, that was good!" Jabiru is playful, but as graceful in his play as a seal on dry land. A favorite mode of resting is on his entire foot, heel and all, and when seated on a little elevation in this position, one sees him silhouetted against the sun, with the light shining through the loose, crimson skin of his neck, the sight is likely to remain in the mind of the observer for a long time. The bird has the power of distending this skin, which then becomes a brilliant scarlet, and this gives the neck an immense diameter, and the bird a most bizarre appearance. It is from this habit that the bird gets its name, the Indian word *Yabirú*, meaning "blown out with wind." It inhabits South and Central America and even comes across the Texan border, so it is rightfully included among the birds of the United States. Very little seems to be known of its habits except that it nests in high trees and lays "blue-green" eggs.

The crested Curassow is a large, striking bird with a very beautiful recurved crest. The feathers forming this are crisp and shining black, and look like dyed shavings as much as anything. The rest of the bird is black with the exception of the under parts which are white, and a bright yellow fleshy

cere at the base of the beak is very conspicuous. A more gentle bird could not be imagined, but when excited for any reason, it has a most curious habit of drawing back its head and raising its tail over its back until head and tail touch, and in this position it struts around, uttering little squeals and grunts. Ordinarily it can be picked up and carried around with as little fear being shown or notice taken, as if it were a wooden bird without feelings of any kind. This is a native of Central America and lives in thick forests, where it congregates in flocks. It is as much prized for the table as quail or grouse.

Having considered a "rare" stork and a "rare" gallinaceous bird, we may select an example from the pigeon family which well merits a place on this list. The Great Crowned Pigeon, a native of New Guinea, is one of the most beautiful birds in the Park. A giant of its kind, it is as large as a good-sized fowl, and its delicate crest of compressed feathers gives it a martial and imposing appearance. It is of a general lavender color, with a broad band of brown on its back and wings, and the latter are ornamented with a large patch of white. The striking effect of its crest is enhanced by the bright scarlet of the eyes. It utters at times a curious low murmuring or booming, very penetrating, and which has such a ventriloquial quality, that it was some time before this sound was traced to its source. Like most of the pigeons and doves—notwithstanding their reputation for gentleness—this great pigeon is quarrelsome, and when annoyed by another bird or preparing to attack it, both wings are lifted to a vertical position over the back and brought down with telling effect. But it has some redeeming qualities, for one of these birds not long ago adopted a young ringdove whose parents were negligent, and cared for it, defending it and at night sleeping close beside it, the two birds presenting a disparagement in size which was ludicrous—the tiny nestling dove and the greatest of all pigeons.

Turning to one of the several unusual species of perching birds in the collection, the Himalayan Laughing-Thrushes are well worth mention. Another name is Jav-Thrush, but this signifies little, for they are neither jays nor thrushes, but belong to a peculiar family of birds having their home in India, with the habits of thrushes, the appearance of jays, and anatomical characters of several other divisions of birds. They are sprightly, active birds and keep their cage-mates, the grackles, starlings and troupials, in healthy activity all day. These so-called thrushes are brownish on the body and tail, with an immaculate white

throat and breast, and a tall crest, white, tinged with the most delicate pearl-gray. A conspicuous jet-black line extending backward through the eye, completes the appearance of these handsome birds. Every morning and at intervals during the day, they give utterance to most remarkable duets, to a certain character of which they owe one of their common names. It is a true duet, each bird



PHOTO BY R. H. RANDOLPH

DUCK HAWK.

holding its particular part. One gives voice to a rapid series of yelping sounds, which by a stretch of the imagination, might be said to resemble a wild, frantic laugh. The other bird has a double note which marks the time and sounds very much like "bob-white, bob-white." They sit side by side when giving this duo, and lean toward each other, holding the bills pointing upward.

The giant condor of the Park has established a reputation for playfulness among birds of prey, which never was suspected heretofore, but a pair of recent arrivals—Caracara Eagles (or rather hawks, for they are first cousins of the little sparrow-hawks)—have overthrown all precedent. These birds have been adopted by the Mexicans as their national emblem, and it must be said that in some particulars they are more worthy of the honor than that which is accorded to our bald eagle. Both, however, have their weaknesses—the Caracara does not disdain carrion, while our emblematic bird is very often a thief, robbing the osprey of his hard-earned fish.

The Caracaras run and chase each other, jump into the air and chuckle, in a most kittenish way, and a dangling string tied to the top of their cage with a rag at the lower end, affords an opportunity for amusement, which ends only with the destruction of the rag.



PHOTO BY E. R. SANDORN.

CARACARA EAGLE.

These birds are very tame, hopping up on one's knees and taking pollywogs from the hand. As soon as they were installed in their cage, watch was kept to see if they would live up to a curious habit related of them. This they did to perfect satisfaction. When excited, as when both have hold of the same mouse, one will occasionally utter a noise like a grunt with a rolling r-r-r-r-r at the end, at each note raising the head farther and farther back, until sometimes it is almost in an inverted position, the bill resting on the back. They can skin a mouse with wonderful expertness, leaving the skin of the body inside out and almost entire, looking all ready for the arsenic of the taxidermist. The head of the animal is, however, generally first torn off.

Within the confines of New York City, most birds have yielded to the omnipresent English sparrow, but even a short distance beyond its limits, Nature—wild and untamed—asserts herself. Two new arrivals at the Zoological Park give evidence of this—a pair of Duck Hawks about four weeks old, which

were captured near the Hudson River. They have not yet lost all their nestling down, but fiercer little creatures could not be imagined. They fly at the hand which holds out a mouse to them, as though they would tear one's fingers to pieces and their fierce "eagle-eyes" snap with anger. Right well do they support the reputation which tradition has given them, for they are the "noble peregrines" of Falconry, the fiercest of birds for their size. They roam over the whole world with hardly any variation in plumage and none in disposition. For years a pair have laid their beautiful eggs—creamy white blotched with rich chocolate—on a little ledge of rocks overlooking the Hudson River, finding in neighboring poultry-yards, covies of quail and passing ducks, an abundant larder. Volumes have been written, treating of their training and exploits, and this very species is the one which was reserved for the use of nobility—earls alone could hawk with them, and they ranked second only to the regal gyrfalcon, the king's bird.

These birds seldom desert a spot which they have once chosen as a nesting site, and the parent hawks will now probably choose a more inaccessible crag on our palisades, and rear their young in safety. Let us not begrudge a few chickens as payment for the sight of these birds, so different from our lethargic "hen" hawks (which seldom feed on hens). We can little afford to lose another noteworthy feature from our all too deforested and "debirded" country.

When we have an unusually severe winter, when the snow lies deep, and weeks of clear cold weather make the season worthy of its name, we sometimes find that other inhabitants of the Arctic realm, besides snow-birds and cross-bills, are among us. Seven great Snowy Owls in the Zoological Park testify to this. These came southward with the more severe storms of last winter, floating lightly at night in the track of the storm, searching for places where a lesser cold encouraged small birds to be abroad, or where the snow crust allowed field-mice to run their tunnels through it. These great creatures easily hide from our eyes, almost indistinguishable in their snowy plumage, but crows and jays find them out, and make such a noise that everything and everybody within a half mile soon know of their discovery. On attempting to snatch the bait from a mink-trap, the steel jaws close over the feathered talons of the owl, and hold him fast.

These are beautiful birds, the older ones being almost immaculate, and their great, yellow eyes staring out of the depths of their

fluffy plumage, render them noteworthy objects. It is safe to say that seven Snowy Owls living together in perfect health, is a sight which is seldom seen, even in the best zoological gardens.

The fine Whooping Crane in the collection should not be omitted from the list of rare birds, as there are only three others in the United States living in confinement. This bird is an inhabitant of the Western Plains and the Mississippi Valley, but is now very rare. He well deserves his name, although his loud ringing cry is more like a trumpet call than a whoop. The means by which it is produced is quite remarkable. The bird's windpipe, which altogether is nearly five feet in length, forms several complicated coils within the hollowed breast-bone, very like the convolutions of a French horn. This crane is a beautiful and even majestic creature, standing over five feet in height, and its entire plumage is pure white. The tail feathers are long and arched, and when the bird spreads his wings, stretches out his neck, and runs with great strides down his range, his value as "a show bird" is very evident.

Rare and Interesting Mammals.

At this date the Society has on exhibition the following rare animals:

A *Musk-Ox*, from the Barren Grounds north of Great Bear Lake.

A *Sumatran Rhinoceros*, from Perak, Malay Peninsula.

Two young *Grizzly Bears*, from Alaska.

A pair of *Tahr*, from the Himalayas.

A pair of *Woodland Caribou*, fully adult, from Maine.

A large male *Orang-Utan*, and a *Baby*, nine months old.

Two baby *Chimpanzees*.

A very large and fine *Jaguar*, from Paraguay.

A baby *Sea-Lion*, born on the dock at Santa Barbara, and mother.

An adult male *Anoa* (Pigmy Buffalo), from Celebes.

Eight *Japanese Red-Faced Monkeys*.

Young specimens (1902) of *Mouflon*, *Aoudad*, *Buffalo*, *Elk*, *Red Deer*, *White-Tailed Deer*, *Sika Deer* and *Mexican Deer*.

Almost all visitors dislike reptiles except when they are behind the plate-glass of the Reptile House, and wage a continuous warfare against the harmless little garter-snakes, which the Society so carefully fosters about the grounds. Twice the writer has had occasion to remonstrate with men engaged in slaughter; and on various walks the crushed remains of the little creatures have been noted.



PHOTO BY E. R. SANDORN.

SNOWY EGRET.

Notes.

"Czar," the little European bear cub, recently developed two large abscesses on the back, about the loins. With the assistance of four keepers, the swellings were lanced, and the pus drawn. Bites or scratches received in play are thought to be the cause.

* * *

A furious thrust through the fence caught the Mouflon ram on the sharp horn of the Anoa (Pigmy Buffalo), whose temper, by-the-way, is akin to that of the Sandhill Crane. The horn penetrated the skin, at the base of the skull, quite to the bone, but not however inflicting a serious injury. The wound was successfully dressed with antiseptics and made a slow but good recovery.

* * *

Of all the water-fowl in the Park, the Mallard is the most prolific and persistent breeder. At one time seven ducks had stolen nests in the long swamp grass near the Small Mammals' Pond, and laid at the least calculation 150 eggs. Soon after these had hatched, the surface of the pond seemed to be infested with a new species of number-bug. The young mallards reared this season will number nearly 200.

* * *

It is worthy of note that Great Blue Herons, numerous Night Herons and Screech Owls frequently visit the Park. The herons are attracted by the birds in the Flying Cage, and one Night Heron has remained all summer perching upon that structure. Often about sunset a gray Screech Owl has been seen on the top of the Screech Owls' cage, endeavoring to break in. Mr. Beebe believes that if it were not for the blasting, a great many more would make their homes here.

From being one of the most peaceable and kindly disposed of birds, one of the Sandhill Cranes has developed a temper bordering on the fiendish. A stranger entering the corral would be surprised to see the bird stride boldly toward him, flatten himself on the ground, stretch out his wings, at the same time making a curious booming sound. If not keenly on the alert, the next moment would see the bird rise suddenly in the air, and make a headlong dive straight at his face. At any sign of timidity, the attack would be furious, and considerable damage, perhaps the loss of an eye, might result from the lightning thrust of the strong beak. If, however, the caller is aware of the attack, a quick grasp about the neck renders the bird practically helpless.

* * *

Recently upon attempting to enter the Rhinoceros' cage, the keeper was met by a vigorous charge from this unusually amiable animal. Several attempts at reconciliation failed to reduce the local irritation, and Conrad was at last compelled temporarily to withdraw. A close examination of the animal showed the eyelids of one eye greatly swollen, with opacity of the cornea, and small hemorrhages in the aqueous humor. The *membrana nictitans* completely covered the eyeball. The animal was immediately put upon a light diet of green food and a laxative administered, to reduce blood-pressure. The eyelids were kept continuously wet with boracic-acid solutions, applied by syringing through the bars. Four or five days' treatment sufficed to put Kance well on the road to recovery, and four weeks effected a complete cure.

* * *

The largest Japanese Red-faced Monkey has developed a very bad temper. Having bitten his keeper quite badly, like Alexander he looked about for other worlds to conquer. The Mangabeys being available, he managed to draw a long tail through a double partition of wire netting, and bite off three vertebra. Then, in order to draw the skin over the end, the doctor took off a fourth. This slight loss in no way interfered with Mangabey's social responsibilities, as he took his place with the rest, at once. With a dozen other monkeys in sight, old Red-face again attacked his first victim, and repeated the injury by taking off two more vertebra. He was thereupon sentenced to the solitary confinement which his conduct had earned for him.

The bravery of the Red-faced Monkey is noteworthy, and once a sally is made at him, he accepts the challenge, and attacks without hesitation. A tussle with such an animal would be anything but a pleasing diversion.

* * *

An innovation, which is bound to attract as much attention as the "picture-label," and also interest the visitor in an equal manner, is the "Map of Geographical Distribution." These maps have been placed at the various ranges and the bear dens, and, as fast as completed, will be put up in the buildings and other installations. For out-of-doors the map-case is constructed upon water-proof principles—a frame of zinc with front of glass, 14 x 17½ inches—making it impervious to all climatic changes and the humid atmosphere. The map itself is printed upon heavy paper in the best style of the "printer's art," and the geographical distribution and type locality of each species carefully marked. Upon the map is printed the data necessary to explain its meaning. For the interior, where the space is limited, the map will be smaller.

RECENT ARRIVALS.

MAMMALS.

Two adult Orang-Utans and one infant; 2 Chimpanzees; 1 Japanese Ape; 2 Barbary Apes; 7 Japanese Red-faced Monkeys; 1 Pig-tailed Macaque; 3 Yellow-bearded Lemurs; 1 Gray-headed Lemur; 3 Rufled Lemurs; 1 Tiger

Cub; 2 Pumas; 1 Civet Cat; 1 Ocelot; 3 Lynx; 3 Otters; 4 Japanese Bears, representing 2 species; 3 Sloth Bears; 2 Siberian Badgers; 1 Chinese Sand Badger; 1 Japanese Fox; 1 Raccoon Dog; 1 Binturong; 1 Hairy-eared Rhinoceros; 1 Musk-Ox; 5 Sea Lions; 2 Aoudad; 1 Chamois; 1 Tahri; 1 Lama; 4 Mule Deer; 2 Sika Deer; 1 Japanese Deer; 1 Prong-horned Antelope; 1 Japanese Wild Boar; 2 Spotted Cavy; 10 Kangaroo Rats; 6 Coyote Rats; 4 Fox Squirrels; 9, 13-lined Spermophiles.

BIRDS.

Two Himalayan Laughing Thrushes; 1 Siberian Jay; 2 Rose-breasted Cockatoos; 1 Military Macaw; 8 Snowy Owls; 2 Caracara Eagles; 2 Duck Hawks; 1 Mexican Guan; 4 Black-shouldered Peacocks; 3 Wild Turkeys; 3 Mongolian Pheasants; 3 English Pheasants; 2 Ring-necked Pheasants; 1 Jabiru; 2 Wood Ibis; 2 Roseate Spoonbills; 6 Great Blue Herons; 1 Yellow-crowned Night Heron; 3 Ward's Herons; 3 Little Blue Herons; 3 Snowy Egrets; 6 American Egrets; 3 American Flamingoes; 2 Brown Pelicans; 5 Snake Birds.

REPTILES.

Twelve Iguanas; 1 Alligator Terrapin; 1 African Mud Turtle; 113 Turtles, of seven species; 1 Black-tailed Python; 1 Regal Python; 4 African Rock Snakes; 1 Indian Sand Boa; 7 California Gartersnakes; 4 Texas Rattlesnakes; 3 Diamond-backed Rattlesnakes; 5 Banded Rattlesnakes; 3 Cobra-de-Capillos; 4 Japanese Salamanders.

BIRTHS.

Mammals.—10 Timber Wolves; 7 Coyotes; 2 Northern Plains Fox; 11 Opossums; 1 Canada Porcupine; 5 Virginia Deer; 2 Mexican Deer; 2 Elk; 1 Fallow Deer; 1 Pekin Sika Deer; 1 Red Deer; 3 Buffalo; 1 Axis Deer.

Birds.—25 Red Jungle Fowl; 4 Golden Pheasants; 1 Reeves' Pheasant; 24 Ring-necked Pheasants; 12 English Pheasants; 9 Mongolian Pheasants; 6 Lady Amherst Pheasants; 6 California Partridges; 2 Wild Turkeys; 1 Black-shouldered Peafowl; 3 Indian Peafowl; 7 Wood Ducks; 100 Mallard Ducks.

Reptiles.—The following reptiles deposited eggs: Cuban Crocodile, Horned Lizard, Large-headed Turtle, Spotted Turtle, Chicken Snake, Black Snake, Hog-nosed Snake, and Rainbow Snake.

GENERAL INFORMATION.

ADMISSION.—On all holidays and on Sunday, Tuesday, Wednesday, Friday, and Saturday, admission to the Zoological Park is free.

On every Monday and Thursday, save when either of those days falls on a holiday, only members of the Society, and persons holding tickets from the Society, are admitted free. All others pay twenty-five cents for each adult, and fifteen cents for each child under twelve years of age. Tickets are sold only at the entrances.

OPENING AND CLOSING.—From May 1st to November 1st, the entrance-gates will be opened at 9 A.M. and closed half an hour before sunset. From November 1st to May 1st the gates will open at 10 A.M.

BICYCLES must be checked at the entrances (five cents). All wheels not called for half an hour before sunset will be locked up until the following day.

RESTAURANT.—At the Rocking Stone Restaurant meals are served à la carte every day from 10 A.M. to the closing hour.

In the North Pavilion of this building is a spacious lunch counter, where all kinds of luncheon food are served at popular prices.

The Reptile House Lunch Room has been closed.



PHOTO BY E. R. SANDREN.

TEXAS RATTLESNAKE.

Crotalus adamanteus atrox.

NOTEWORTHY NEW REPTILES.

BY R. L. DITMARS.

Since the beginning of the present year, many interesting specimens have been added to the collection in the Reptile House. Among these arrivals, the majority of which are new to the Park, are three specimens of the Indian Cobra-de-Capello, a huge Ceylonese Monitor, a Python over twenty feet long, one Florida and two Cuban Crocodiles and a number of Rattlesnakes, the latter constituting a thoroughly representative collection of the group.

The Cobras arrived unexpectedly. While visiting the establishments of the animal dealers, the writer discovered them. Packed in small, tight boxes, these interesting creatures, for which the New York Zoological Society has been searching and writing since the opening of the Reptile House, were in miserable condition for want of water, and would have died in a few days. They were hurriedly shipped to the Park, where careful treatment effected a transformation. Within two days' time after their arrival, they divested them-

selves of old skins, and appeared in scintillating coats of yellow and black. The antics of these snakes, as they rear from the ground and spread their "hoods," has been a constant source of interest to visitors. At the present time they constitute the only specimens of the Spectacled Cobra alive in this country. The reputation of this snake is world-renowned, owing to the terrible loss of human life from it in India. Sir Joseph Fayrer estimates the loss of life from the Cobra, in India, to average 20,000 every year.

One of the finest and most interesting specimens in the Reptile House is the big Monitor, or "Kabra Goya." This huge lizard is specially fond of eggs, which it swallows entire. A dozen eggs constitute a meal, and so quickly are they tossed down the greedy throat, that they may be heard to click together in the process. Without doubt, the Monitor represents the highest development and intelligence in the lizards. It attains the largest

size and displays the greatest strength of any of the lacertilians. In a wild state, the several species of monitor are bold and voracious, preying upon small mammals, birds and their eggs, as well as frogs and fishes. Upon seizing an animal of sufficient size to show substantial resistance, they fiercely shake it to death, in much the same manner as a terrier does a rat.

During the early part of the present year, the Society was fortunate in securing a specimen of the Cuban Crocodile (*Crocodilus rhombifer*), which came as a gift from Capt. A. G. Hammond, of the 8th U. S. Cavalry. The specimen is about 5 feet long, and very hostile. It is exhibited in the central tank of the main hall, in the Reptile House. Quite recently, another crocodile arrived at the Park. This is a specimen of the Florida Crocodile (*Crocodilus americanus acutus*), measuring eight feet nine inches in length, and was presented by Mr. Julian A. Dimock, of New York City. A few days after her arrival in the Reptile House, this specimen deposited thirty-one eggs. The eggs were placed in a hastily improvised incubator, and probably will yield an interesting colony of young saurians.

For some time past, efforts have been made to secure a representative collection of rattlesnakes. These endeavors have resulted in placing the following species on exhibition: South American Rattlesnake (*Crotalus terrificus*); Diamond-Backed Rattlesnake (*C. adamanteus*); Texas Rattlesnake (*C. atrox*); Red Rattlesnake (*C. atrox ruber*); Timber Rattlesnake (*C. horridus*), and the Southern Ground Rattlesnake (*Sistrurus miliarius*). This series of species comprises twenty-four specimens.

The different species of rat snakes, representing the most showy of the American snakes, are well represented by about one hundred and thirty specimens. This may be also said of the southern water snakes, which constitute one of the most attractive cages in the building. The latter vary in color from brown, green and yellow into brilliant shades of red. A particularly large specimen of the Brown Water Snake (*Natrix taxispilota*), arrived recently. With its thick body, triangular head and sinister markings,

this snake is more formidable in appearance than the venomous "Cotton-Mouth" with which it lives in the coffee-colored waters of the Savannah River.

Three large pythons arrived recently at the Park. Two are of the Black-Tail species (*Python molurus*), and one a Regal Python (*Python reticulatus*). The latter is over twenty feet long, and makes a fitting cage-mate for the magnificent female python, "Czarina," purchased some two years ago. The larger of the Black-Tailed Pythons is a gift from Mr. William Barbour, of New York. It measures eighteen feet in length, and about fourteen inches in circumference.

The Curator of Reptiles has received a letter from a correspondent in the West Indies, that a magnificent specimen of the Fer-de-Lance has been captured, and will be shipped to the Park at once.

This specimen will be particularly interesting from the fact that large numbers of these dreaded snakes were destroyed during the recent volcanic disturbance in Martinique, and it was thought for a time that the portion of the Island principally infested by the reptiles, had been smothered with ashes and dust. Although this is not the exact condition of affairs, the name of the Fer-de-Lance has once again come into prominence. In the French Islands of Martinique and St. Lucia, this formidable snake has always been dreaded and its appearance strikes terror to the traveller. It is one of the largest of the tropical vipers, and provided with fangs that are almost invariably fatal in their work.

The specimen on the way to the Zoological Park is over six feet long, and described as especially brilliant in coloration. When the reptile arrives at the Park, it will be exhibited in the series of cages containing the rattlesnakes and other viperine serpents.

The south pavilion of the Rocking Stone Restaurant has been tastefully arranged to accommodate the overflow from the dining-room. Palms and plant-baskets are generously scattered about, and the surroundings of trees and green sward add greatly to its beauty and popularity.



PHOTO BY E. R. SANBORN.

LONG-LIPPED SLOTH BEAR.

THE DIRECTOR'S TRIP ABROAD.

Stocking the Lion House requires a special effort on the part of the Society, as the selection of lions, tigers, leopards and other cage felines worthy to represent their respective species and thoroughly fit for breeding purposes, can not well be accomplished by correspondence. This is a matter of personal inspection and special selection. It is highly important that the original stock of lions and tigers, especially, should be jungle-bred animals, and not the offspring of caged parents. One of the most interesting features of cage collections of felines, is the breeding of young lions and tigers; aside from the interest always attaching to young animals of this species, they sometimes prove a source of revenue not to be despised.

By the direction of the Executive Committee, the Director of the Zoological Park sailed for Europe on August 16th, provided with a special fund of \$13,000, for the purchase of animals for the Lion House, and also an additional sum to be devoted to the acquisition of new specimens of ibex and wild goats for the

inclosures soon to be finished on Mountain Sheep Hill. Several members of the New York Zoological Society have personally contributed sums of money for the purchase of particularly fine lions, tigers and leopards, to enter the collection as their special gifts. Among these, one which is noteworthy is the gift of the little daughter of Andrew Carnegie, who, when asked by her father what she wished to give to the "Elephant and Tiger Man," promptly responded, "The biggest hairy-headed lion in the world, papa." Mr. Carnegie's comment on her reply was quite characteristic. He said, "naturally, she chose the most expensive animal; but her promise will be made good." It is the intention of the Director to visit the establishments of all the principal dealers in wild animals in England and northern Europe.

The Society is advised that in anticipation of the stocking of the Lion House and Mr. Hornaday's intended visit to Hamburg, Mr. Carl Hagenbeck has held back from sale a number of specially fine lions, tigers and leopards, which have come into his hands during the past year, and it is highly probable that some of the best specimens now for sale in Europe are to be found in his famous Theirpark. It is not expected that the Society's representative will succeed in finding for sale and subject to immediate delivery the entire series of animals necessary for the Lion House collection, and it is highly probable that to secure some of the rarer specimens standing orders will have to be placed until the animals can be obtained.

In connection with the search for animals, the Director will inspect the Zoological Gardens of England, Germany, Holland and Belgium. He will also visit the Duke of Bedford's celebrated collection of hoofed animals, at Woburn Abbey, and study the methods that have been employed in caring for the many specimens that have been brought together there.

During the absence of the Director, Mr. H. R. Mitchell, Chief Clerk of the Zoological Park, has been designated as Acting Director. The various improvements now in progress in the Park will be vigorously prosecuted.

CRITICISM OF A GREAT ZOO.

The Humanitarian League of London has republished in pamphlet form, a long and severe attack on the London Zoological Garden by Edmund Selous. Mr. Selous' criticisms are aimed at small inclosures for animals in that famous institution, and what he claims are the sufferings of the animals consequent thereto.

The London Zoo is one of the greatest zoological gardens in existence, and delights and interests three-quarters of a million of visitors, all of whom pay admission. It is in no need of defence, but in the interest of justice, however, it is proper to point out the fact, that nothing save the short-sightedness of municipal government, prevents expansion of the grounds now occupied, to an extent which would provide ample room for all the animals exhibited. On the three sides of the Garden, lies unoccupied and practically useless, lands of no special beauty, belonging to Regent's Park.

Occasionally, it is roamed over aimlessly by visitors who have no particular object in view. The casual American observer can see no good reason why fifty acres of the useless ground of Regent's Park should not be added to the thirty acres occupied by the Zoo Garden.

When Dr. Selater was asked if such an addition could not be made to the Society's domains, he responded with considerable feeling, "they will not give us another foot of it."

Clearly, it is impossible for the London Zoo to become a Zoological Park, with abundant room for all its animals, until more land can be secured from Regent's Park. We hope that we will live to witness the making of a substantial addition in real estate to the grounds of the great Zoo of grateful memory.

New Improvements.

Antelope House.—On June 26th, a contract for the erection of this much-needed building was let to Thomas Dwyer, at \$54,900. Time allowed, 100 working days.

Bear-Dens.—On the same day, a contract for the erection of the iron-work for four new bear-dens was let to W. H. Wright & Son, at

\$5,327. Time allowed, 60 working days. The foundations, floor and sleeping-dens are now being constructed by the ground-improvement force of the Zoological Park. These dens are merely an extension of the present dens, and will complete the series as originally planned.

Beaver Valley Walk.—The walk through Beaver Valley is not only under construction, but half finished. It leads in a fairly direct line from the Buffalo Entrance past the Polar Bears' Den and Beaver Pond, to the Primates' House on Baird Court. It leads through very beautiful woods, and being a short cut from Baird Court southeastward, will be very popular.

Mountain Sheep Hill.—Work on this noteworthy feature is progressing rapidly, and will be completed about September 1st.

Drainage of Buffalo Range.—All the low, wet ground in the Lower Buffalo Range has been thoroughly underdrained, a shed and macadamized corral built for that Range, and hereafter it will be in constant use.

Rhinoceros Yard.—A temporary open-air yard for the use of the Sumatran Rhinoceros, pending the completion of the Antelope House, will be constructed immediately, at the eastern end of the Reptile House.

Fence and Walks East of Bronx Lake.—Very shortly a fence will be erected on the eastern boundary of the Park, to protect the forest from timber-thieves. At the same time, a Telford macadam walk will be built along the eastern bank of the Bronx, from West Farms to Bronxdale.

PUBLICATIONS.

FIRST ANNUAL REPORT	Paper, 40 cents
SECOND " "	Paper, 75 cents. Cloth, \$1.00
THIRD " "	" 40 " " 0.60
FOURTH " "	" 40 " " 0.60
FIFTH " "	" 75 " " 1.00
SIXTH " "	" 75 " " 1.00
NOTES ON THE MOUNTAIN SHEEP OF NORTH AMERICA. (Hornaday).	Paper, 40 cents
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NEW GAME PROTECTION.

It is to be remembered that one of the avowed purposes of the New York Zoological Society is "the preservation of our native animals."

During the past winter the Society has been very active, and also successful, in urging the passage of game laws. In Newfoundland, one of the best examples of game legislation ever enacted has become a law. It completely recasts the game laws, increases the license for non-residents to \$100, and limits the killing of caribou under such license to two stags and one doe, instead of five stags and two does, as was formerly permitted. Water killing is entirely prohibited. This method of hunting is particularly objectionable to sportsmen, but unfortunately was much practiced in Newfoundland at certain seasons of the year, when the deer were migrating across the lakes. In order to protect the deer during migration, the entire month of October is made a closed season. During the last few years, since the completion of a railroad across the Island, there was almost a continuous line of camps and hunters lying in wait for the

animals when they crossed the track on the southward migration. One of the wisest provisions of the new law is that which cuts out a strip ten miles wide, with the railroad in the centre, and prohibits all shooting within those limits.

Provision is also made for organizing the guides, and making them share the responsibility for the enforcement of the law.

If the new law is enforced against the natives, as well as against visiting sportsmen, it will undoubtedly prove to be very effective in protecting the large game in one of the finest hunting countries in North America.

Acting through its secretary, the New York Zoological Society has been largely instrumental in formulating an acceptable law for the protection of wild life in Alaska, a district heretofore entirely without protection for its animals, other than the fur seal and sea otter. The bill was introduced by Hon. John F. Lacey, to whom all animal lovers owe a debt of gratitude. It received quick and cordial endorsement from the press throughout the United States generally, was passed by both houses of Congress, and by the signature of the President became a law on June 7th.

The passage of the Alaskan game bill was a great triumph for the cause of game protection, and the prompt manner of it is a cause for profound satisfaction. There is hope for some of our large mammals, after all! The Lacey law prohibits the exportation of wild meat, hides and antlers, except when accompanied by the owner; it limits the number of specimens to be taken by each hunter; it establishes closed seasons, and, most important of all, provides that when any species is threatened with extermination, the Department of Agriculture may impose further limitations and restrictions on their killing, even so far as to prohibit the killing of such species entirely for five years in the district affected. Provisions are also made for the enforcement of the law, but eventually Congress should provide annually not less than \$25,000 for the pay of an Alaskan Game Commissioner, and a force of carefully selected wardens.

Alaska is a country of such vast extent, and conditions vary so greatly within its limits, that the new law will require amendment from time to time, as conditions become better known. The question of the enforcement of the law is, and ever will be, a serious one; but if no other immediate result is achieved than stopping the wholesale exportation of gigantic moose antlers from the Kenai Peninsula, and the slaughter of game animals for their hides, the law will be abundantly justified.

THE CASE OF THE WHITE-TAILED
DEER.

The general zoologist, interested more in animals than in their names, who attempts to stand midway between the small body of technical zoologists and the masses of the unscientific public, is certain to be torn by conflicting emotions. Compared with him, Prometheus was a comfortable and even happy man. He must cheerfully confront the masses with the assurance that scientific zoology is the foundation of all infallibility, even while the vultures of Nomenclature are gnawing at his vitals. Whether he will or no, he must change the scientific names on beasts and birds as often as the inexorable scientific leaflet demands, and without making a wry face, carry them out to three decimal places.

There are times, however, when the general zoologist is filled by a wild desire to go berserk, and say things. In his calmer moments, he firmly resolves to cut loose from all scientific names, and make an open campaign with common sense as the only issue. He writes a scorching lecture entitled "Popular versus Unpopular Nomenclature"; which so relieves his mind that he calms down sufficiently to go out and make a fresh lot of changes on his labels.

To-day, the Name-Makers are in strife as to who yields the heaviest pick and shovel, and who can dig the deepest after fossil names for living animals. It matters not for how many decades, or centuries, the name of a popular wild animal has been in the public prints, nor how many million people are acquainted with it. If your Hunter-of-Fossil-Names discovers a particularly obscure deposit of antediluvian science, straightway he hies him to the unworked cemetery, and digs and explores, regardless of the risk of being caught by many kinds of ancient germs.

Possibly he finds that some prehistoric nobody, whose scientific work died a-borning, bestowed upon some wild animal a Latin name—or at least insinuated one—fifteen minutes prior to the bestowal of the name by which the millions of to-day know it. The new-found name is tenderly taken up, scraped, disinfected, and patched up until it will hold together. It is then brought into the light of day, and laid as an offering at the feet of the fetish called Priority. This means that the familiar name, the one in universal use, must fall down, and give place to the new-found fossil.

But there is one source of grim satisfaction. Each fossil name is certain to be knocked out by other fossil names,—and so on, *ad infinitum*. This is a world of change.

As an illustration, take the Virginia, or White-Tailed Deer, a modest and unassuming animal, and very set in its ways. To the unassisted lay mind, there is no more excuse for changing its name every year than there is in renaming Washington at every session of Congress. But what do we hear?

In 1785, right or wrong, Boddaert named it *Cervus virginianus*.

In 1827, and 1835, and 1841, three other authors mistakenly gave it three other names, without effect. From 1785 to 1884, the following authors wrote of this animal as *Cervus virginianus*:

1788, GMELIN.	1831, GODMAN.
1789, ZIMMERMAN.	1836, SCHREBER.
1792, KERR.	1842, DEKAY.
1801, SHAW.	1844, WAGNER.
1822, DEMAREST.	1851, AUDUBON & BACHMAN.
1823, SAY.	
1825, HARLAN.	1857, BAIRD.
1830, DOUGHTY.	1877, CATON.

During the century covered as above, several foreign authors wrote of this animal under other names than that recognized by the array of highly respectable authorities named above.

With a century of general use in America, the name *Cervus virginianus* had become not only widely known, but one might suppose it to be well fixed, also. Now mark its fall, and the result.

In 1884, by common consent, the leading American mammalogists adopted a name bestowed upon this animal, in 1842, by the English naturalist, *Capreolus virginianus*.
In 1895, Allen called it *Dorcelaphus virginianus*.
In 1897, Rhoads changed it to *Dorcelaphus americanus*.
In 1898, in a book printed on very good paper, Lydekker (of England) seriously adopts for this animal

Alazama americana.
In 1899, Miller dug up *Odocoileus americanus*.
In 1902, Allen proposes to call it *Dama virginiana*.

What next? In the language of the graduating essay, whither are we drifting?

To the general zoologist, all this naming, and re-naming, and tre-naming, of which the above is merely a sample case, would be amusing,—if it were not quite so serious! It does not phase the general public, for through all this erratic bestowal and use of unpopular names, the good old "popular" name, White-Tailed Deer, shines like a beacon,—permanently fixed. The bother comes when a zoologist is required to write a scientific as well as popular label and use the latest and the absolutely-satisfactory-to-all scientific name.

It looks very much as if the worship of the Priority fetish has gone quite far enough. The situation is becoming ridiculous. There are about twenty good men in the mammalogy line who should stop resurrecting fossil names, get together on a common-sense, practical basis, cremate Priority in a fiery furnace, and give us some names for our most important mammals that will go thundering down the ages.

W. T. H.



MOUNTAINS NEAR KNIK RIVER, ALASKA, WHERE *OVIS DALLI* LAMBS WERE CAPTURED.

THE QUEST FOR *OVIS DALLI*

BY J. ALDEN LORING.

ILLUSTRATED FROM PHOTOGRAPHS BY THE AUTHOR.

The New York Zoological Society has been fully aware of the fact that thus far the zoological wealth of Alaska and the Canadian Northwest has been but partially exploited. Not only is it reasonably certain that new forms await the hand of the explorer, but it is unfortunately true that many important forms of recent discovery are, in the museums and zoological gardens of civilization, almost wholly unrepresented by specimens. The Society considers that the capture of living specimens of any particular species is only a matter of well-directed effort, and money with which to meet expenses. Believing that mountain sheep from a low altitude and a humid climate might endure the climate of New York better than specimens from the Rocky Mountain region, Mr. Loring was sent to Alaska to capture a few lambs, and also to establish relations between the Society and various persons in the field.—Editor.

ON April 24th, 1901, on its first trip of the year, the S. S. *Bertha* reached the small settlement of Tyonek, on the western shore of Cook Inlet, and a little more than half way up. The flat on which were situated the building of the Alaska Commercial Company, and a dozen Indian cabins was covered with snow four feet deep, and the little community was yet on a winter basis. Those who owned boats had just begun to overhaul and repair them preparatory to launching them, and it was a week before a craft could be secured to carry me to my hunting-grounds. During this enforced interval I practised daily in walking on snow-

shoes, taking long tramps in order to harden my muscles.

Mr. Thomas W. Hanmore, the Alaska Commercial Company's agent at Tyonek, was exceedingly kind and helpful to me—as he has been to many others before me. I had the good fortune to find at this place Mr. H. H. Hicks, who had been strongly recommended to me as a very intelligent, skillful and personally agreeable guide. His services were secured, and he proved to be an ideal man in every respect—a skillful hunter, familiar with the tongue of the natives, well acquainted with the country, and at all times reliable.

After a long discussion of prospects and possibilities, we decided that the most accessible place for the capture of white mountain sheep lambs was the mountains bordering the Knik River, which stream flows into the upper end of the Knik Arm of Cook Inlet, seventy-five miles from Tyonek. A small settlement called Knik, at the head of Knik Arm, and distant seventy-five miles from Tyonek, would serve as our base of operations farther on.

We left Tyonek May second in a small sloop manned by its owner Mr. McQuinn and an Indian. There was little wind, so all hands bent to the oars until four o'clock in the afternoon. Then a gale rose suddenly, and so quickly did it gather force that while the water around us was yet smooth, the whitecaps could be seen rolling several miles ahead. To make matters more interesting, about five miles from Fire Island large packs of floating ice were encountered, and about the same time something happened to the bowsprit which compelled us to furl the jib. This of course made the boat difficult to manage. Fortunately we were well under the lee of the shore before the force of the gale struck us; and after an hour of anxiety, we reached the north point of Fire Island and anchored for the night.

For small craft the navigation of Cook Inlet is always difficult and dangerous. Owing to the strong tides, it is impossible to go anywhere unless they are in one's favor. Should a traveler fail to reach his destination before the tide turns, unless he has a strong wind in his favor, he must come to anchor, or his boat will drift back to the starting point. On account of gales that rise with remarkable suddenness about Fire Island and Turnagain Arm, the waters in this section are considered the most dangerous of any in Cook Inlet.

It became necessary to station a watch at night to keep the boat in deep water, and look out for ice. By the time the tide had turned again in our favor it was too dark to proceed, so we received little benefit from it, making but ten miles before anchoring in the mouth of Knik Arm. At low tide the boat was high and dry on a mud flat, where we remained until the water rose. We then made sail and crossed to the north bank of the Arm, where large masses of floating ice obliged us to drift with it. There is little danger from drifting ice so long as it does not become stranded, but should this happen it of course jams and endangers any craft caught in it.

Nearing Knik we saw with our field glasses that the ice in front of the village was intact. It formed an island, or peninsula as it afterwards proved, with a channel on each side. We were on the outer edge of the pack and

between the boat and shore the ice was thickly jammed. McQuinn said we would have to force a way through it to the inner channel, or be carried up the wrong side of the inlet. While the other members of the party opened a passage with the oars, I jumped out on the ice and hauled the boat into the right channel, and we were soon drifting forward between walls of ice.

The channel was open but a short distance, and at high tide the pack jammed. Within about a mile of Knik we were met by Mr. Tool and Mr. Palmer, agents for the Alaskan Commercial and North American Commercial Companies. They came to advise us not to approach nearer for fear of being caught in the jam. Heeding their warning, we took shelter behind a huge block of ice that had broken from shore and stranded. By the time the cargo was unloaded the tide had turned, and McQuinn and his Indian crew turned back. It was with a feeling of uneasiness that we bade them good-by, and watched their small boat struggling in the ice until the blocks became so thick that only the mast was visible.

Mr. Tool generously placed his cabin at our disposal and in many ways both he and Mr. Palmer gave us much assistance.

At Knik we spent two days negotiating with the Indians, and in repairing a river boat I had hired. I also engaged two Indians upon whom the whites bestowed the names of Andrew and Billy.

The next morning we left Knik and kept ahead of the ice until high tide, then camped near a cabin some fifteen miles from the mouth of the river. I had been told a native named James Ephim was camped near here. Inasmuch as he was said to be a good hunter, we hoped to secure his services. No sooner had a fire been started than a group of Indians collected, one of whom was Jim. When Hicks told them the object of the expedition, the Indians laughed at us and said it was impossible to catch lambs, as they were born in inaccessible places and a few hours after birth could easily escape. However, as soon as Hicks told Jim that we wanted to hire him, there was a change in his manner. Then he was sure we could capture all the lambs wanted, and began at once to pack his outfit.

Preparations were made for an early start, but there was too much ice to proceed with safety, so a delay was necessary until nearly high tide, when we crossed the Arm and attempted to land. The ice ran close to shore, and there was danger of the boats being crushed against the bank.

Jim and his family were ahead. They

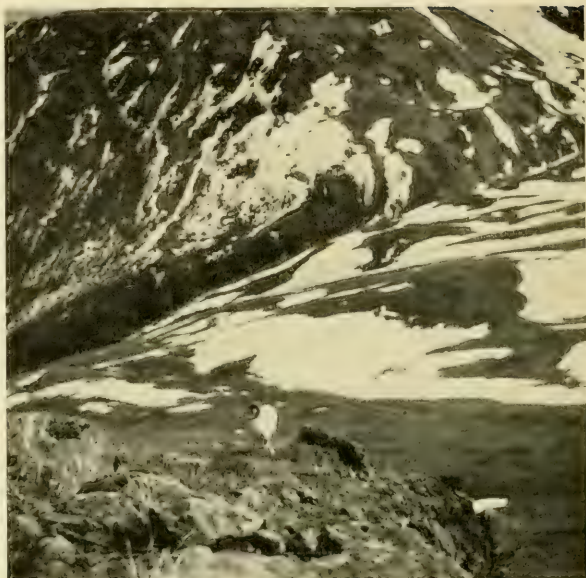
floated with the ice for some distance, then at a favorable opportunity pushed through the pack, ran into a small inlet, jumped ashore and hauled their boat upon the bank. This could not so easily be done with our boat however, as it was much larger and heavily laden. Our Indians followed along the beach, ready to help in case of an accident. After drifting half a mile we made for a mass of stranded ice, which afforded us some protection, and with the assistance of the Indians were soon out of danger. When the tide turned, we were kept busy pushing off the cakes that threatened to crush the boat. At low tide the ice on which we stood would be the top of a wall eight feet high, so as the tide receded we had to keep our boat in deep water. The ebb tide was about half out when a huge mass of ice drifted free from the bar, and threatened to block the channel from shore to shore. Luckily for us, before reaching our boat the outer end struck a mud flat, and held until the dangerous end had swung past us.

At eight o'clock we were off again and kept well ahead of the ice, making camp about midnight.

It was with a feeling of profound relief that we landed a few miles from the mouth of Knik River and realized that the battle with the treacherous ice and tides was over. As one could reach shore by jumping over the ice cakes, there was little danger of loss of life, but an accident to the boat meant a total failure of the trip.

Little of interest occurred during the next two days. We found the river, as Indian Jim had predicted, difficult to navigate. From the start it was necessary to tow, or "line," the boat up the swift current, and to avoid bars we were obliged to cross and recross the stream many times. Quicksands were numerous, and Jim insisted on carrying an oar with which to rescue himself when mired.

May tenth found our camp pleasantly situated north of the river on the level floor of the Knik Valley, at the junction of two small



LET US HOPE THAT HE IS STILL ROAMING THE KNIK MOUNTAINS, FREE AND UNHARMED.

streams, and about two miles from the mountains. By cutting a few trees and some brush, an excellent view was obtained, and we were able to remain in camp and watch for sheep without alarming them. The season was fully a month backward, and the mountains were covered with deep snow. It did not seem possible that lambs could be born and live under such conditions, and I was convinced that we were quite early enough for our purposes.

On the afternoon of the day that we made camp (No. 1), two of the Indians shouldered their rifles and started off, to hunt for moose and bear. Hicks called them back and explained that I had come a long distance to capture sheep, and did not want them to do anything which would cause the trip to prove a failure; that rifle-firing would scare the sheep to other feeding grounds, and therefore could not be permitted. The Indians obeyed, but it was plain they did it unwillingly. Both had been guides for government expeditions, and after the day's work had always been allowed to hunt. It was their nature to kill, and it was hard for them to understand why they were not allowed to shoot on this trip.

The plan adopted to capture sheep was to locate a band of ewes, and keep a strict watch

over them until a lamb was born, then attempt to catch it.

From the time we camped, sheep were constantly in sight, three to the westward, and three almost opposite us, but they were too far distant for us to determine their sex.

During three days we spent in watching these animals, Hicks and Billy took a two days' journey round the mountains north of camp, to see if there was less snow on that side of the range. In the meantime the Indians and myself maintained a close watch of the mountains within sight, and made several excursions to the eastward. We went up the mountains, also, and learned that the sheep were all rams.

Hicks returned and reported there was more snow in the country he visited than about us. He saw three sheep and a black bear, all of which he could have killed.

We derived considerable pleasure from watching a lazy old ram, not more than a mile from camp. He was evidently leading a hermit life, and was daily seen feeding on the grassy slopes just above timberline, returning to the high crags to spend the night. Every morning he came down for breakfast, and spent much time basking in the sun. While the Indians were up the river cutting a passage to a lake preparatory to packing into the mountains, Hicks took my camera and secured several fine photographs of old Billy, as we had named this sheep. The Indians were anxious to kill him, but I forbade it, telling them that after we had captured lambs they should have

fresh meat. Let us hope that the old fellow is still roaming the Knik Mountains, as free and unharnessed as when this picture was taken.

One evening Andrew saw a black bear and two cubs feeding on a mountain-side close to camp. The Indians asked permission to go after them, but I told them to wait, and if they went into a canyon toward which they were making, we would attempt to capture the cubs alive. They did enter the canyon, and at once we started in pursuit. I forbade the Indians carrying their black-powder rifles, the great noise of which would scare everything within miles, but my gun being a modern "Savage" made but little noise and we thought that one shot fired in a canyon, could do no harm to our plans. However, when about a quarter of a mile distant from us the three bears went into the thick timber, and were not seen afterwards.

On the mountains some fifteen miles eastward of Camp No. 1 there appeared to be a spot quite free from snow, and which looked as if it would be favored by sheep as feeding grounds. Accordingly on May sixteenth we, shouldering packs of fifty pounds per man, left our base camp and set out for the more promising locality.

After following the river for about three miles we hauled our boat ashore, turned it over, and took to the timber at the foot of the range. From our noon camp on a flat in the river bottom, which commanded a good view of the mountains across the river, five sheep were seen feeding. As the mountains ahead seemed more promising, we continued our march, and finally went into camp for the night on the bank of a mountain stream coming down from the north.

The following day, Hicks and Billy discovered a band of five ewes east of our camp. This was good news, for we were now situated midway between two bands of five sheep each. Our plan was that they should watch the sheep found by them, while Andrew and I attended to those west of camp. Stations from which to watch were established at intervals along our route, and at the last one we usually made tea and ate luncheon, remaining through the afternoon. In this way we



HICKS AND THE FIRST LAMB CAPTURED.



I FOUND HICKS SEATED UPON A LOG WITH A SNOW-WHITE LAMB.

had under observation about fifteen miles of the mountain range.

For a week we spent the entire time at these lookout posts, watching the bands of sheep, and hoping that lambs would be born. Several black bears were seen feeding close to timberline, and often they were so near the sheep as to cause us uneasiness. Once we made an effort to capture two cubs that were following their mother, but they evaded us.

When the clouds obscured the mountains we were often unable to find the sheep until late in the afternoon. It was remarkable how little they moved about when feeding. For two or three days a herd would remain in the same place, but of course taking to the rocks at night. Once a herd must have been alarmed during the night, for when we sighted it the following morning it was almost over the divide. To us in the valley it seemed as if no living creature other than a bird or squirrel could possibly secure footing where they stood. Several times after hours of watching what seemed to be lifeless crags, sheep have walked out from crevices as though from the solid rocks.

We were in constant fear that something would happen which might cause our trip to fail. For instance, should the sheep decide to change their feeding grounds, or become badly frightened by a bear or wolf, they might cross the range, and even if we knew the direction they took it would be almost impossible to follow. The greatest danger, however, lay in the possibility of a storm which would envelop the mountains in clouds, for should

lambs be born at such a time, the probabilities were that before we could find them they would be so strong and agile we would be unable to capture them.

Meanwhile Hicks and Billy patiently kept their band of sheep under observation. At one time four new animals joined it, but a few days later became frightened, made to the top of the mountain where they remained several days, and finally left altogether.

Hicks reported that for two days one of the ewes had acted strangely, restless when feeding, lying down more than usual, and taking little interest in the wanderings of its associates. This naturally led us to

believe the long-looked-for time was near.

One forenoon before leaving camp, three sheep appeared on the mountains directly opposite. They were traveling from the direction frequented by the sheep Andrew and I had been watching, and naturally we supposed them part of our band. This supposition was correct, for after spending the day at our customary station, our ewes could not be found. The next morning we climbed the mountain opposite camp, determined if possible to locate them. Tracks leading west were crossed, but it was not until just before starting for the valley that they were espied in the crags, on a mountain far to the west.

Returning to camp I loaned Andrew my rifle and gave him several "miniature" shells to use on rabbits. Soon afterward I heard shots in the timber west of camp. I knew they must have been fired by either Hicks or Billy, and thinking possibly they had shot at a bear, I took Andrew's gun and ran down the bank of the creek, hoping to secure a shot. Waiting a few minutes I started for camp, and soon saw Billy ahead of me, carrying two guns. He said Hicks was in camp with a lamb. Much to my joy I found Hicks seated on a log, with a beautiful snow-white lamb standing rather unsteadily in front of him. The story of its capture is best told in the words of Hicks.

"For some time after reaching the place where we had watched the sheep, the one that had acted so strangely could not be found. An hour or so later, it walked out of a gully among the rocks, a lamb following. It was about half a mile above timberline, in the cen-

ter of a mass of rocks and crags. We mapped out our route and started in pursuit. For some time we kept together. While skirting along a narrow ledge above a cliff, Billy became frightened and trembled so I feared he would lose his hold. I told him to keep his eyes above him. He said he knew he should do so, but it was so far down he could not help looking there. After a few minutes' rest we went on, and soon were out of our greatest danger.

"It took an hour and a half to climb to the point where we were to separate. Billy then followed up a canyon to the right of the sheep, while I made a detour to the left, intending to get above them. Progress would have been easier had we been able to take advantage of favorable places without being seen. We knew that at the first sign of danger they would take to the inaccessible peaks, and probably cross the range. Our plan was that Billy should creep close to the lamb and conceal himself, while I worked between it and the other sheep, then, when they were out of its sight behind the rocks we would scare them, and immediately advance on the lamb.

"The plan worked admirably. Some hard climbing was necessary before I reached a suitable position. Rising, I allowed the sheep to see me, and an instant later they were bounding up the mountain. The lamb was on a narrow shelf, and by creeping up from both sides we blocked all chances of its escape. It scampered back and forth, but did not attempt to jump over the ledge. We worked slowly, and it quieted down until at last it ran into Billy's arms, and was our captive.

"It took its capture as a matter of course, and did not bleat or struggle until we started for camp. In descending difficult places one would climb down, and the other hand him the lamb and the guns. I carried the lamb, and its heart beat so rapidly we paused many times for it to rest and become quiet before reaching camp."

This specimen was a male, a beautiful little creature not more than a day old, 10½ inches high at the shoulders, weight 8½ pounds. He scampered about with remarkable agility. He was attached to Hicks, and followed him from



USING POPLAR SAPLINGS WE MADE A CORRAL AND PLACED HIM IN IT.

place to place, but when I attempted to care for him while Hicks ate, he became restless and bleated like a domestic lamb.

Like all young ungulates he stood with his feet braced well apart, and attempted to jump over obstacles instead of going around them. As he was warm, we waited before feeding him, then gave him his first meal of condensed milk, ¼ milk to ¾ water, from a nursing bottle. Feeding proved to be an awkward undertaking, as the lamb did not understand what was wanted. Half an hour after arriving in camp, and about fifteen minutes after feeding, he was taken with diarrhea.

Using poplar saplings, we made a corral about ten feet square, and placed him in it, but he was not contented unless some one was near. Whenever I left, even if for a minute only, he ran back and forth, bumping his head against the bars, bleating, and attempting to jump out. At night I made my bed in one corner of the pen, and as I expected, he shared it. He lay close to my face, and frequently snuffed at it. At last becoming sleepy, he closed his eyes and at each throb of the heart his head sank lower and lower until it rested on my cheek. It was a windy night, and at every strong blast he awoke with a start and sniffed my face, bleating frequently. I could not move without disturbing him, and often lay in one position until my bones ached.

I got little rest until five o'clock in the morning, and then had not more than an hour's sleep until "little Billy," as we named him, was walking all over me. He was very nimble, sometimes trying to jump out of the en-



BILLY AND THE LAMB HE CAPTURED—KNIK RIVER IN THE DISTANCE.

closure. He liked to get as high as possible and whenever I raised the blanket he tried to climb it.

The day after this lamb was captured, a storm set in and continued for three days. The clouds hung low over the mountains, and we lost track of the sheep we had been watching. Under these circumstances we decided that if it did not clear soon, we would return to the base camp, and if no ewes were seen, proceed to a range of mountains near the mouth of Knik River where Professor L. L. Dyche had good success collecting specimens several years previously. We had not gone there at first on account of the depth of the snow.

During this time I was confined to camp, caring for the lamb, and also endeavoring to break up the chills and fever which attacked me every other day. My illness subsided, but the lamb became worse, and it was soon evident that its condition was hopeless. In spite of the medicines administered, it became greatly emaciated, soon lost his appetite, and on the morning of May twenty-seventh, it died lying on my blankets.

The storm continued, and we returned to our base camp, which we found undisturbed.

Remaining here two days, yet being unable to locate any sheep, we again packed up and started for the river, camping early in the afternoon. The Indians packed the outfit over a bar which we could not cross with the loaded boat, and the remainder of the day was devoted

to watching the mountains. Before night a lamb and ewe were seen, but they were in such a bad place it was useless to attempt their capture that day, so we contented ourselves with watching them until dark. At nightfall they took shelter in the high rocks, as usual.

On the following day, Hicks and the two Indians found this lamb, and made an effort to capture it, but the Indians thwarted the effort by carelessness and disobedience, and it ended in failure, much to the disgust of Hicks.

Another day's travel brought us to our destination. Without the loss of a moment we made preparations to pack in several days' provisions, and climb

into the range where Hicks and Dyche had seen large bands of sheep on a previous trip.

After a long, hard climb to timberline, we crossed the mountain and skirted along a steep, grassy slope for about three miles. Our camp was made at timberline, near the head of a small stream that ran through an open valley. The mountains on either side rose abruptly, a steep grassy slope occurring between timberline and the rocks.

As the mountain was so steep that nothing could be seen from our camp, we crossed the creek and climbed to the top of a high knoll. Five sheep were seen about a mile away, and a little later twelve more came into view from behind a point. They were all ewes. After watching for an hour we became convinced there were no lambs in the bunch. Shifting the glasses to the broken country beyond our camp, it was not long before a lamb and ewe were sighted. They were in an awful mass of rocks and crags, near the summit of the range.

As we were about to give chase, the ewe started up the mountain in great haste. Her actions were puzzling, for we were sure she had not seen or scented us. At last we concluded that she was attempting to exercise the lamb. After describing a circle, she returned and lay down near the spot from which she started.

It was a warm day, and long before reaching the rocks we were wet with perspiration. The slope between timberline and the crags

was so steep we had to use our hands as well as our feet, and the work was so exhausting I was compelled to halt frequently. At last we reached the rocks, and I exchanged my shoes for moccasins. It was a great relief to secure a firm footing, and after a short rest I had no further difficulty in keeping with the other members of the party.

The Indians exercised no caution whatever, and after rebuking them several times I finally compelled them to remain behind. Hicks and I went on up, scrambling over craggy rocks, creeping along narrow ledges, and passing through crevices, but always taking care to keep out of sight of our quarry. In many places it seemed as though ascent was impossible, but somehow we always found a ledge or niche where a footing could be secured.

At last, when positive that we were well above the sheep, we halted. While Hicks went ahead to locate the game, I held the Indians back. He returned with the information that three hundred yards above us there was another ewe, but he was unable, without exposing himself, to tell whether it had a lamb. We retraced our steps to a rocky peak, and under its protection sneaked to within a hundred yards of the sheep, when we saw a lamb lying by it.

The mother seemed reluctant to leave the little one, even for a moment, but at last she walked around a point and out of its sight. Then we allowed her to see us, and she took fright, at once. While attempting to get above the lamb, we lost sight of it. Hicks immediately climbed a cliff, and after sighting it, signaled its position to me. I sent one of the Indians to the opposite side, and stationed the other below the lamb, while I came up from the left. Everything being in readiness, Hicks climbed down from above and blocked the only passage. The lamb was resting quietly at the base of a cliff. Then we all moved forward from different directions, and soon had surrounded and captured it. It was not more than a few hours old, and because of its weak condition scarcely made any attempt to escape.

The sheep and lamb we had first seen and started for, had taken fright and crossed the divide. It seemed almost useless to follow



I DECIDED TO TRY NESTLE'S BABY FOOD.

them, but since we were only a few hundred feet from the top of the mountain, and it would take but two persons to carry the lamb already captured, we sent the Indians after the other.

As we were about to return to camp, an eagle suddenly darted round the face of a cliff, and with wings half closed swooped close over our heads. It seemed as if the big bird intended to rob us of our prize; but probably it was as much surprised as we, for it departed as suddenly as it came. Had it been an hour earlier, and the mother and lamb separated by even a few feet, the latter surely would have been captured and devoured.

We placed our captive lamb in a tiny hammock made out of the bottom of a flour-sack, doubled its feet under it, naturally, and pinned the sides of the hammock over its back. With hammock and lamb hanging from Hicks's neck by a stout cord, the head of the captive protruding very demurely, we began to descend toward our mountain camp.

When about half way to camp, we saw Billy about a mile off, tearing down the mountain at break-neck speed, and with the glasses I saw that he carried a lamb. We reached camp shortly before him and found Andrew awaiting us. As soon as he had got out of our sight, the lazy fellow had sneaked back to camp, leaving Billy to follow the sheep alone. Billy killed the ewe, and after an exciting chase cornered the lamb. It was so overcome by excitement and rough handling that it did not attempt to move. After examining the milk from the ewe Billy killed, and finding it

as rich and thick as cream. I decided to try Nestle's Baby Food in the place of condensed milk, as it seemed more nutritious.

The lambs were perfectly contented in the pen which we made for them. The one Billy captured was so fagged out that, regardless of the noise made about camp, it lay down and slept soundly for two hours. The other lamb sniffed at him a few times, then lay down and watched us with much curiosity. The mosquitoes were now so troublesome we made a mosquito-proof tent to place over our two small captives.

The following morning there was a noticeable difference in the strength of the first lamb captured, so much so that we all mentioned it; and truly it seemed to have gained in flesh! Andrew and I started with the lambs for the lower camp, while Billy and Hicks remained to look for others. It was more than probable, however, that all the sheep within range of the sound had fled when they heard Billy's shots the day before.

The lambs behaved well on the way down. Neither of them struggled much, and they appeared interested in all that went on. About noon the one I carried showed symptoms of illness, and on arriving at camp I at once began doctoring it.

A movable wire cage was made, and at night after taking the lambs into the tent and allowing them to go to sleep cuddled close to me, I covered them with mosquito netting, and placed the cage over all. Whenever one awoke, he looked about and seeing his companion sleeping peacefully, dozed off again.

The smaller lamb became weaker daily, and we feared it was not likely to live long. The other, however, was so strong and healthy we had great hopes of keeping it.

Hicks and Billy hunted the mountains thor-



A MOVABLE WIRE CAGE WAS MADE.

oughly, but saw only one more lamb, which they were quite unable to capture. Having ascertained that the ewes had abandoned the country, we decided to leave the next day for Knik.

That night about eight o'clock the strongest lamb was taken sick with the usual disorder, and by midnight was past recovery. The following discouraging entry is copied from my journal under date of June sixth: "This morning between five and six o'clock both lambs died, and left us feeling very blue, but convinced that everything possible had been done for them. An hour later we left for Knik."

Since it has been fully demonstrated that lambs of the Alaskan Mountain Sheep *can* be captured, it would seem that the only other course to follow in attempting to keep them alive, would be to transport domestic goats or sheep to a base camp as far in the mountains as possible, and as soon as lambs are captured hurry them to foster mothers. In this way it may be possible to rear lambs, and take them out of the country alive.

While it might be that with the last two lambs captured the artificial food was to blame for their loss, it is certain that nervousness and excitement caused the trouble with the first one. It was attacked so suddenly the food had not had time to be assimilated.

In closing I take real pleasure in expressing my appreciation of the faithful and skillful services of Mr. Hicks, who from the start entered into the work enthusiastically, and left nothing undone that could contribute to its success. His experience and good judg-

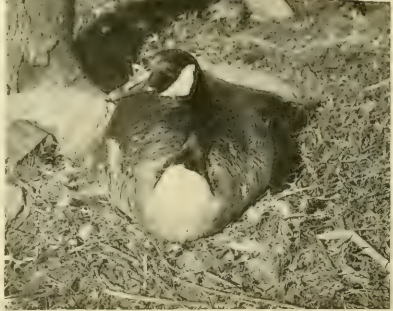
ment were both invaluable. Under no conditions should explorers trust themselves alone in Alaska with Indian help—not that one's life would be endangered, but a man unacquainted with their ways is always in danger of being left in the lurch at a critical period. One white man is worth three Indians, and Hicks is worth two average white men!

As to my Indians, when I think of them a feeling of vexation mixed with pity comes over me. Poor children of Nature! They were children indeed—homesick, discontented unless always killing something, fond of their blankets, more than fond of their provisions. When they should have gone slow they went fast, and vice versa.

My thanks are due Mr. Thomas W. Hammore of Tyonek, Mr. A. C. Goss of Kadiak, and the Alaskan Commercial Company's agent at Knik, Mr. Tool, for many courtesies shown, and they are hereby tendered.



END OF THE SHEEP HUNT—HOMEWARD BOUND DOWN KNIK RIVER



PHOTOS BY E. H. SANBURN

YOUNG COYOTES.

WILD TURKEY: NESTING.

MOUFLOU: LAMB.

CANADA GOOSE ON NEST.

FEEDING A BABY PORCUPINE.

ZOOLOGICAL SOCIETY BULLETIN

No. 8

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THE LION HOUSE



EVERY zoological society which creates a zoological garden puts forth its best effort in the planning and building of its Lion House. Quite naturally, everyone concerned is anxious that the home for the king of beasts, and his

near relatives, shall be in keeping with the position of the lion in the animal world. Aside from this, however, it is desirable that the large carnivorous animals should have the greatest possible amount of space in which to live, in order that they may not seem to be prisoners, in durance vile. However



BENGAL TIGERS.
Gift of Mr. Charles T. Barney.

people may differ on all other subjects, all agree that there is small pleasure in beholding a fine, large animal imprisoned in narrow, mean quarters, not half large enough to render it reasonably satisfied with life.

In addition to considerations for the animals themselves, the public requires, for its own comfort and convenience, a spacious and well-lighted hall; and the health of the animals and safety of the keepers require that the service arrangements should be of the best. Spacious outside cages are now regarded as an absolute necessity to any modern house for the large Carnivora.

The lion houses of Europe afford a very interesting series of illustrations of the manner in which different minds have striven to attain the same end. No two of them are exactly alike, and the majority of them serve their purposes excellently. For all practical purposes, several of them come quite near to perfection; but, thus far, the shadow of the iron bar is over them all.

The Lion House in the New York Zoological Park represents the greatest effort of the New York Zoological Society thus far, and constitutes what will undoubtedly stand, for many years at least, as its finest building. It contains many features which are entirely original, and no effort has been spared to render it of the highest possible value to the public. It is situated in a commanding position on the southeast corner of the level plateau known as Baird Court. Thanks to its position on this five-foot terrace, its western elevation does not convey an impression of a very low building, as would be the case if it stood upon a wide tract of level ground. From whatever direction it is seen, the western side, which is in full view from Birds' Valley, and the Motor Road which runs along the western side of Baird Court, conveys the impression of a highly artistic structure built of the finest materials. The wealth of sculptured stone and terra cotta, presenting realistic carvings of large feline animals, are calculated to impress the observer quite strongly; and this impression will reach its climax in the two life-size sentinel lions, carved in stone, which sit in repose on each side of each main entrance to the building.

GROUND PLAN.

The essential features of the Lion House consist of a main hall, 192 feet long and 28 feet wide; a series of cages, 21 feet deep, along its eastern side, and a series of exterior cages, also extending the entire length of the

eastern wall, and varying in depth from 24 feet to 42 feet 6 inches. Over all, the structure is 240 feet long, and its extreme width at the centre is 110 feet. The style of architecture is uniform with that of the other large buildings of the Park, and similar building materials have also been used. The brickwork seems lighter in color than the walls of the Primates' House and Reptile House, because of the fact that the bricks have been laid in yellow mortar, instead of dark red.

This building is much more richly ornamented with animal sculptures and cut stone than any of the other buildings. The roof of the main hall is quite high, and the ceiling of very light yellow pine harmonizes perfectly with the color of the masonry. The long western wall of the building is pierced by spacious windows, opening upon the line of trees which shade the building on the west. In the centre, the western wall is broken by a large alcove, semi-hexagonal in shape, the side-walls of which are unbroken by windows. This alcove is to be used for the exhibition of collections of drawings and paintings of carnivorous animals, and other animals also, if the Society so elects. It is provided with spacious skylights, and it will admirably serve its very unique purpose. Primarily, it is intended to exhibit in this alcove instructive pictures of carnivorous animals which, by reason of their rarity, are seldom found in zoological gardens.

Along the western wall of the building a raised platform has been constructed, two steps high, with oak settees against the wall. This platform is intended to enable a large number of visitors to overlook the heads of those standing upon the floor, and who otherwise might entirely cut off the view of the animals in the cages.

THE INTERIOR CAGES.

The interior cages are twelve in number. Six of them are extra large, 18 x 22 feet. These are intended for the finest lions and tigers, and for families of cubs. Six smaller cages, the dimensions of which are 12 x 22 feet, will accommodate the leopards, pumas, and cheetahs. The floors of the cages are raised three feet above the visitors' floor, and have been constructed of strips of maple, set on edge. Each cage is provided with two sleeping dens, which can, when necessary, be cut off entirely from the other portions of the enclosure. The top of the sleeping dens has been finished as a sort of balcony, running back to the outer wall of the building, to



MAIN HALL OF THE LION HOUSE.

which access is gained by stumps of trees so cut as to form what stage-carpenters call "practicable steps." The floor of each balcony is five feet high, and animals moving about upon it present a very fine spectacle, fully visible to every visitor on the floor.

The cage fronts represent a great innovation in the confining of dangerous animals. Instead of the heavy iron bars, hitherto in universal use for the confinement of large carnivorous animals, which not only cut off much of the view of the animal, but continually suggest the prison idea, the fronts of these cages have been fitted with wire netting specially made by the Page Woven Wire Fence Company, of Adrian, Michigan, for this building. The mesh is three inches square. The horizontal wires are those which are relied upon to resist the attacks of the animals. These are of hard steel, size No. 5, and each wire has a tensile strength of about 4,500 pounds. Each end of each wire is wrapped around a heavy frame of round wrought iron, twisted tightly upon itself, and the end soldered down.

The horizontal wires are held in place, and equidistant, by perpendicular tie-wires, three inches apart, wrapped around the horizontals at each point of intersection, and firmly soldered. The panels made by the Page Company have been set into heavy frames of angle iron, and securely bolted. The whole of this iron work has been painted dull olive-green, to match the tiling in the interior of the cages, and the netting comes as near to being invisible as anything ever can which is strong enough to confine lions and tigers of the largest size. The mesh interferes less with the view of the animals than anything that has yet been devised. As to its strength, and the possible ability of the animals to break through it, there is good reason to believe that if the attachments of the angle irons held fast, an elephant could not break through it.

The interior walls of each cage have been covered with glass tiling of a dull jungle-green color, specially made for this purpose, which is carried up a height of seven feet. As a background for the display of feline animals, it is an unqualified success, and from a sanitary point of view, it is equally perfect. The walls above this have been painted with oil and stippled an amber-gray color. The ceiling of each cage is about one-half skylight, so that the animals have an abundance of light for exhibition purposes, and quite as much as is good for them.

THE EXTERIOR CAGES.

The exterior cages have been planned somewhat differently from the interior cages. This series consists of three enormously large cages—two semicircular, and one square—and six smaller cages. Each of the large cages represents two of the large interior dens, and at first will be used by the occupants of these dens alternately. They have been planned, however, with a view to subdividing them later, if it should be found desirable. The large semicircular cages at the north and south ends of the series are 38 feet wide and 42 feet 6 inches deep. The large central cage measures 38 x 38 feet, and the smaller cages are each 12 feet 6 inches wide by 24 feet deep. The fronts of all these are of wire netting, the same as appears in the interior of the building. During the coming spring, and prior to their occupancy by the animals, all the exterior cages will be provided with rock-work, stumps and trees, as far as may be desirable to promote the comfort and satisfactory display of the animals. Following the custom of most European gardens, all these exterior cages have been covered with half-glass roofs, chiefly for the purpose of making them acceptable to the animals in rainy weather. They face the southeast, and therefore receive the greatest possible amount of sunshine.

CAGE SERVICE.

Perfect cage service demands the following conditions:

First. Direct communication for the animals between the interior and exterior cages.

Second. The accessibility to keepers of all cages from the rear—not the front.

Third. Means by which animals may be introduced to, or removed from, their cages elsewhere than in the spaces provided for visitors.

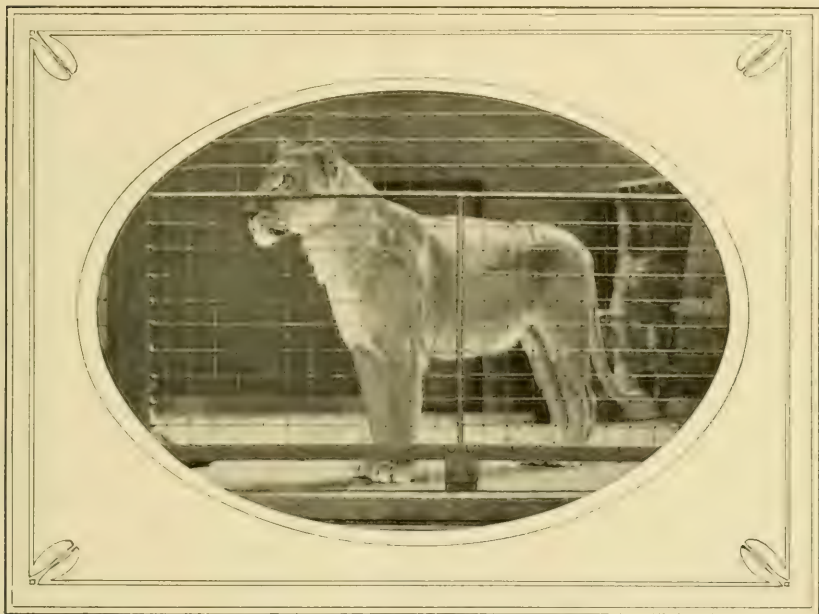
The filling of the above requirements demands what is really a central cage service—a feature which hitherto we have found in only one lion house. In the London Gardens, the cage service of the lion house is indeed central; but the exterior and interior cages are entirely separated from each other by the keepers' passage. In order for an animal to go from one of its dens to the other, the keepers must connect those two dens by means of a bridge resting upon a car—a matter which involves considerable time, and careful management.

In the planning of the Zoological Park

Lion House, central service has been secured, and direct communication between inside and outside dens has also been obtained, by means of a keepers' passage underneath the sleeping dens, and an elevator shaft between each pair of cages. The elevator shaft opens on each side into a sleeping den, the front door of which opens into the interior cage, and the rear door into the outside cage. To introduce an animal, it is transferred from its traveling cage into a transfer cage which rests upon the platform of a car, which can be

immediately liberates the animal in its appointed place.

In the same manner, animals intended for exhibition in the studio will be taken from their cages, transferred, and brought back again. By means of this arrangement, the keepers can gain access, at any time, to any sleeping den, and they can also shut an animal into its sleeping den and gain safe access to the main floor of its cage. All the doors of the sleeping dens, and the partitions, are of sheet steel, running on trolleys, and opening



BARBARY LIONESS, "CLEOPATRA."

Gift of Mr. O. H. Payne.

raised or lowered by means of hand power applied to very simple machinery attached to the car.

This car runs on a track laid in the keepers' passage through the entire length of the building. The car stops under the elevator shaft which communicates with the particular cage to be reached. The cage is elevated until its floor is on the same level as the sleeping dens, when the opening of two doors

and shutting by means of chains and pulleys operated in the keepers' passage.

THE STUDIO.

From the inception of the planning of the Lion House, now six years ago, it has been the intention of the Zoological Society to provide within this building a feature specially designed to facilitate the work of artists, sculptors, and students doing serious work in

the drawing, painting, and modeling of animals from life. To this end, a spacious and well-lighted room has been provided at the north end of the building, wherein at least twenty artists can be accommodated while working on living models, literally and truly "Far from the madding crowd" which to a working artist is a living terror. Against the eastern side of this large and airy room has been constructed a cage 16 feet deep and 20 feet wide. The back of this cage, its north end, and practically the entire roof, are of plate glass, properly protected on the outside by iron bars. Through a trap-door in the floor, the transfer car will deliver an animal directly into this cage from the keepers' passage. The cage front is necessarily of wire netting. The main floor of the room will be constructed in a series of platforms to accommodate the easels of those for whom this feature is intended.

As may readily be inferred, the object of this feature is to encourage and promote the work of animal painters and sculptors, both amateur and professional. The Society hopes that it will be the means of bringing into existence a considerable number of animal paintings and groups of statuary, which without it might never be produced. On stated days, certain animals will be exhibited in the studio cage, provided the number of persons desiring to work from it justify the labor of making the transfer.

PLANS AND ARCHITECTURE.

The ground plan and cage arrangements of the Lion House were designed in 1896 by the Director of the New York Zoological Park. The architectural work is by Messrs. Heins & La Farge, and the engineering by Mr. H. de B. Parsons. The decorative animal sculptures are from models executed by Eli Harvey, and will form the subject of special notice. The terra cotta, which forms a prominent feature, was manufactured by the Atlantic Terra Cotta Company. The building was erected by Thomas Cockerill & Son, who performed the work in a manner highly satisfactory to the Zoological Society and the Park Department. The work of construction proceeded under the joint supervision of the architects and Martin Schenck, Chief Engineer of the Park Department for Bronx Borough, representing Park Commissioner John E. Eustis. Work on the building began on July 20, 1901, and the total cost of the complete structure will be \$150,000. It will be opened to the public early in January, 1903, with a full collection of animals.



CHEETAH, OR HUNTING LEOPARD.
Gift of Mr. Jacob H. Schiff.

RARE AND INTERESTING SPECIMENS.

AT this date, the Zoological Park contains a larger number of rare animals than it has shown at any previous time. The following are the species of special interest and value, and all of them are of decided rarity in zoological collections:

A pure white animal, strongly resembling the Arctic Fox, has been received from northern Japan; but thus far no scientific authority available has revealed its place in Nature. It seems to represent a species not yet described.

A male *Siberian Ibx* (*Capra siberica*), three years old, collected by the agents of Carl Hagenbeck, in western Mongolia, is with great difficulty confined in one of the enclosures of Mountain Sheep Hill.

A very beautiful male *Burrhel* (*Ovis burrhel*), from the Himalayas and Thibet, came to the Society from the Zoological Society of London, in exchange.

A male *Urial*, and two females (*Ovis vignei*), have been received from India by way of Hamburg.

A *Cape Hunting Dog* (*Lycan pictus*), from South Africa, came by purchase from Hagenbeck.

A *Tasmanian Wolf* (*Thylacinus cynocephalus*), is one of the most recent arrivals from Hagenbeck.

Three pairs of *Blue Foxes* (*Vulpes lagopus*) have been received through Mr. Thomas E. Hofer from one of the fox breeding establishments in Alaska.

Two *Bonneted Langur Monkeys*, with golden-yellow throats and breasts, are the rarest primates now on exhibition, and are the only specimens of the kind which ever came into Mr. Hagenbeck's possession.

A young *Malay Tapir*—its coat now changing from spotted to the black-and-white colors of adolescence—was brought by Captain Golding, in November, from Singapore.

A *Manchurian Leopard*, from Shanghai, owes its presence in the Zoological Park to the detective instincts and persistence of Captain Golding in following its trail through the hands of butchers, traders, showmen, and other parties in Shanghai.

The *Red River-Hog*, exhibited in the Small Mammal House, came from the London Zoological Gardens, and represents the only beautiful species of wild swine in existence.

A fine pair of *Maral Deer* from the Caucasus Mountains, exhibited in Deer Range No. 56, adjoining that of the Virginia Deer, represents the beginning of a special effort toward the development of a collection of deer that shall be worthy of the Zoological Park.

The specimen of the *Cheetah* in the Lion House collection is a reminder of the fact that this species is now very rare in zoological gardens and menageries.

The two young *Ocelots* in the Small Mammal House, bred in the Zoological Park, are of special interest because of the extreme rarity with which this species breeds in confinement.

A pair of *Prjevalsky Horses* (*Equus prjevalskii*), from the first lot of specimens ever captured for exhibition, were shipped from Hamburg on December 14th, and should be on exhibition in the Park before this issue of the *Bulletin* reaches the members of the Society.

Rare Birds.

The following birds of special rarity have recently been received and placed on exhibition in the Bird House.

One *Paradise Crane*, from Africa.

Two *Crowned Cranes*, from Africa.

One *Vulturine Guinea Fowl*.

Two *Caracara Eagles*.

One *Seriema*, from South America, the most remarkable bird in the Park.

Three *Great Crowned Pigeons*.

One *Australian Crested Pigeon*.

Two *Spur-Winged Geese*.

Two *Australian Sheldrakes*.

Reptilian Rarities.

Three specimens of the famous and deadly *Cobra-de-Capello*, of India, for the bite of which no antidote is known, are the only representatives of this species which have reached the United States during the last five years. From all appearances, dealers are afraid to handle them, and some zoological gardens in Europe are afraid to exhibit them.

The *Florida Crocodile*, nine feet in length, on exhibition in the Reptile House, is of special interest in comparison with the Alligators.

The *Fer-de-Lance* in the series of poisonous serpents has given birth to twenty-four young, which are being reared with special care.

Two *Rhinoceros Iguanas*, from the West Indies, exhibited in the Iguana cage, were purchased of the Hamburg Zoological Garden.

A fine specimen of the *Giant Tortoise*, from the Aldebra Islands, is the first specimen of its kind that the Park has received from the Old World.

BEAVER VALLEY WALK.

THE construction last year of the trunk sewer from Baird Court to West Farms made it possible to construct last summer the much-needed walk from the Buffalo Entrance direct to the Polar Bears' Den, the Beaver Pond, and the southeast corner of Baird Court. For two years this direct thoroughfare has been greatly needed, and its construction has been a source of great satisfaction to visitors. Its total length is 2,725 lineal feet, and it winds in graceful curves and on easy grades through the most beautiful portion of the forest area west of the Boston Road. In summer its cool shade makes of it a very popular promenade.

In order to make the outdoor cages of the Primates' House available to visitors, and provide a suitable terminus for Beaver Valley Walk, the whole eastern half of that building was surrounded with its permanent pavement of Telford macadam.

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RARE WILD HORSES.

ABOUT twelve years ago a Russian traveler, named Prjevalsky, discovered in one of the deserts of Sungaria, Central Asia, between the Altai and Tyan-Shan Mountains, a new species of wild horse, which has since been described and named in honor of its discoverer. Amongst wild horses and zebras, it is the nearest approach to the domestic horse of civilization, and supplies an important link, hitherto missing, in the chain of evolution which reaches down from the three-toed horse to the domestic animal of to-day.

In appearance, the Central Asian horse (*Equus prjevalskii*) is much like the Persian wild ass. Its mane is erect, it has no forelock, it has the four leg callosities of the horse, but the upper half of the tail is short-haired, like that of the zebra. At first sight, the upper half of the tail appears to have been clipped six months ago. The body color of the animal is a peculiar yellowish-drab, or mouse-color, and a black stripe extends from

the shoulders along the median line of the back.

The remoteness of the region inhabited by this species rendered its capture a matter of great difficulty and expense. Three years ago, Mr. Hagenbeck received from the Duke of Bedford an order for several specimens, to be purchased, if captured, at \$5,000 per pair. On the strength of this order, Mr. Hagenbeck felt justified in sending out an expedition to capture a number of specimens of the animal desired. His agents penetrated to the northern border of the Gobi Desert, where they found themselves in the land of the Kirghiz, a tribe noted for its horses and expert horsemanship. Engaging the services of nearly two thousand Kirghiz horsemen, and taking with them fifty brood mares in foal, the collectors sought the desert home of the wild horse.

After a series of exciting adventures, Mr. Hagenbeck's agents succeeded in capturing fifty-two young colts of the wild horse species. These were nourished by the domestic mares that had been taken along for that purpose, and after a proper interval the outward march was begun. It took three months for the caravan to reach the Siberian Railway, and depart for Hamburg. During the journey twenty-eight of the wild colts succumbed, and only twenty-four reached Hamburg alive. The expedition was in the field nearly eighteen months, and its expense footed up nearly \$25,000. The collection reached Hamburg in the summer of the year 1900, and all the animals save one pair were promptly disposed of. Twelve are now in the possession of the Duke of Bedford, and others are on exhibition in the zoological gardens of London, Berlin, Hamburg, and in the possession of private parties in Germany.

The approaching completion of the Antelope House has justified the Zoological Society in acquiring the last pair of animals for sale from the Hagenbeck collection. Their purchase price has been partly raised and partly guaranteed by Professor Henry F. Osborn, Messrs. William C. Whitney, Philip Schuyler and Charles T. Barney. If the animals arrive safely, as expected, they will be exhibited, temporarily, in the corral connected with the northeastern corner of the Mule Deer Range, situated on Osborn's Walk, half way between the Bird House and the northwest entrance.

Unfortunately, even the rarest animals are not immortal, and as usual in all such cases, we advise all persons specially interested to see them as soon as possible after their arrival.

A TRAGEDY IN THE LION HOUSE.

THOSE who are responsible for the care and management of wild animals in captivity are constantly reminded that it is impossible to know what deed of violence an animal is liable to perform, until it is actually done. Often the cunning of a caged animal is past finding out, until the event occurs. Then we are all post-mortem philosophers. As a particularly striking and painful instance, take the case of "Lopez," the jaguar.

From the day of his arrival at the Park, last May, "Lopez" has never been one of the snarling kind. On the contrary, he constantly manifested what was considered a playful disposition. Most large felines of savage disposition show it by snarling, and charging against their bars. "Lopez," on the contrary, seemed anxious to play with anyone who came near his cage, and had a trick of rolling on his back, with his paws in the air, quite after the manner of a good-natured house cat.

In Hamburg, a female jaguar, very nearly full grown, was purchased as a cage-mate for him. "Lopez" was the first animal placed in the first finished cage of the new Lion House, weeks before the workmen had completed the other cages. Inasmuch as the female had been six weeks in her traveling cage, and sadly cramped for room, it was decided to place her in the Lion House without delay. In order to ascertain the temper of "Lopez" toward her, her cage was raised to the level of his, and the two were placed with their bars in close proximity. "Lopez" was greatly interested by the stranger, and attempted to play with her through the bars. She observed him without any manifestation of fear, and seemed to be interested by the prospect of a larger cage, and a companion in captivity.

For two days the female's cage stood in the position described, and during all that period "Lopez" manifested not the slightest ill-temper or displeasure toward the new arrival. At the end of that time the Director held, on the spot, a consultation with the keepers, and it was agreed that it would be quite safe to admit the female to the cage of "Lopez." The doors were opened, and without the slightest fear or hesitation the female jaguar walked into her new home.

Instantly, the whole nature of "Lopez" changed—or rather, his real nature came to the surface. His scheming for an advantage had been successfully carried out. With a savage growl, he rushed upon the unsuspect-

ing female, seized her by the right side of the neck, and held on, biting savagely. From the first instant, the female seemed utterly powerless. With an iron scraper, and a hardwood pole ten feet long, "Lopez" was beaten over the head and prodded in the face; but he only shut his eyes and tightened his grip on the neck of his victim. In the midst of his punishment, he rose from the floor, carrying the female in his jaws as a cat carries her kitten, and walked to the opposite side of his cage. It was nearly a minute before the savage creature was forced to quit his hold, and resist the attacks made upon him by the keepers. When he released the female, she lay upon the floor, motionless, and in two minutes more was quite dead.

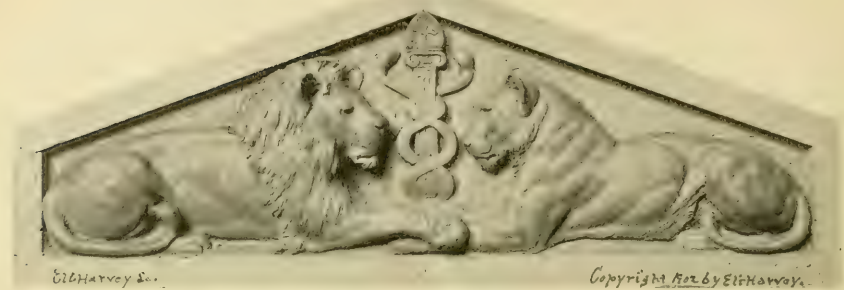
At first it was supposed that one of "Lopez's" canine teeth had penetrated the jugular vein of his victim; but the autopsy made by Dr. Blair revealed the astonishing fact that two of the neck vertebrae had been completely crushed, and the spinal cord penetrated by fragments of bone. The injury was inflicted by a square bite, with no wrenching, and the murder was fully premeditated. As an exhibition of the terrible strength of the jaguar's jaws, it was quite as astonishing as it was unexpected and shocking. As a consequence of this act of treachery, "Lopez" will live in solitude the remainder of his life.

THE ANTELOPE HOUSE.

ON June 26, 1902, a contract was made by the Park Department with Thomas Dwyer, who erected the new wing of the Metropolitan Museum of Art, in the sum of \$54,000, for the erection of a large and finely appointed building for tropical hoofed animals, such as giraffes, African antelopes of every description, zebras and wild horses, and wild cattle of the equatorial zone.

The Antelope House is an elliptical building, 142 feet long by 78 feet wide, and is being constructed of buff brick, gray limestone and terra cotta, in the same general style as the other large buildings of the Park. Around its interior walls it will provide a series of 24 stalls for animals, 4 of which are very large (19 x 24 feet) and the remainder are of various smaller sizes. From the exterior of the building will radiate a series of open-air yards, adequately shaded by trees, and properly macadamized.

Work on this building began on August 1st, and there is no good reason why it should not be completed and occupied by May 1, 1903.



PEDIMENT GROUP, OVER MAIN ENTRANCES.
Reproduced from Sculptor's Model.

ANIMAL SCULPTURES OF THE LION HOUSE

WITH the erection of its first large building for animals—the Reptile House—the New York Zoological Society adopted the policy of employing realistic animal sculptures as leading embellishments. So far as we are aware, this marks the beginning of a new departure in architecture. The good example of the Egyptians, in rendering their architectural sculptures of animals as nearly like life as their sculptors could make them, seems to have been abandoned. Having before their eyes the fearful example of the lions of the Alhambra, modern architects have elected to shelter themselves behind grotesque figures in stone, which were either above or beneath criticism.

To an indifferent sculptor, and an architect who is powerless to furnish a good realistic model, a grotesque lion, griffin, or other reptilian "what-is-it," is a safe alternative. To a layman, the only possible excuse for an animal monstrosity upon a building is that it indicates a desire for the proper thing. Today, however, there is absolutely no excuse for the disfigurement of fine buildings by the display upon them of apocryphal animals

in stone or terra cotta. The visitor to the South Kensington Museum notes with surprise that the keystones and cornices of that magnificent building represent only impossible monsters.

In this connection, it is worthy of record that one of the first public buildings in America to be ornamented with realistic animal sculptures was the Lewis Brooks' Hall of Science, at the University of Virginia, erected in 1880, or thereabouts, from plans furnished by Professor Henry A. Ward, of Rochester. The exterior stone-work of this building is ornamented with realistic animal sculptures, chiefly representing the heads of American animals.

In the ornamentation of the Lion House, the application of realistic animal sculptures, in architecture, may almost be said to have reached high-water mark. Besides two sentinel lions at each door of the main hall, there are to be twenty-four pieces of chiseled stone, and also a cornice ornamented with animal heads, running the entire length of the building, and across each end. All these sculptures are by Mr. Eli Harvey, and are quite as realistic as if in-



DESIGN FOR PANELS ON THE WESTERN WALL.
Reproduced from Sculptor's Model.

Copyright, 1902, by Eli Harvey.

tended to be placed in an art gallery, instead of being used as they now are. There are no starved-and-skinned lions like those which disfigure the entrance to the Erie County Savings Bank, in Buffalo, of recent perpetration; nor are there any lions with architectural clover leaves sprouting out of their tails, as appear at the entrance of another building which we could name, but will not. In the parlance of the busy street, Mr. Harvey's lions, tigers, leopards, jaguars, and pumas are the real thing, and any taxidermist, with an unmounted skin before him, might safely choose a model from this splendid array of heads and complete figures.

The soundness of Professor Osborn's judgment in calling Mr. Harvey from Paris to execute the sculptures shown on the Society's finest animal building, has been fully justified. For many years Mr. Harvey has made a special study of large feline animals—especially the lion and tiger—and he brought to this task ripe artistic judgment, backed by years of successful experience in one of the homes of art. His reputation in Paris as an animal sculptor was of the highest. Thanks to the co-operation of the city authorities, the employment on this work of the sculptor specially chosen for it was easily rendered possible. The result will constitute a source of pride to the citizens of New York as long as the Lion House stands intact, and the very moderate expense involved is amply justified by the results achieved.

It is impossible to convey, in the limits of this brief notice, an adequate conception of Mr. Harvey's work. Indeed, the work itself is yet far from completion. The pediments, ornamental panels, and keystones, all to be cut from solid stone, are as yet wholly unfinished, for the reason that the work of the sculptor could not proceed until the stones were in place in the building. It is hardly possible that this outside work can be undertaken during the winter; but the models for it are ready, and show what the finished results will be. At present, the only sculptures

in place are the ornamental panels in terra cotta on the eastern side of the building, those in the interior of the main hall, and the terra cotta cornice. The latter bears a series of heads of pumas, jaguars, and leopards. The heads of lions and tigers are reserved for the large panels which appear in the side walls. The sentinel lions, now being executed in pink marble from Tennessee, and designed to flank the main doorways, are nearly finished, and it is expected that they will be placed in position early during the com-



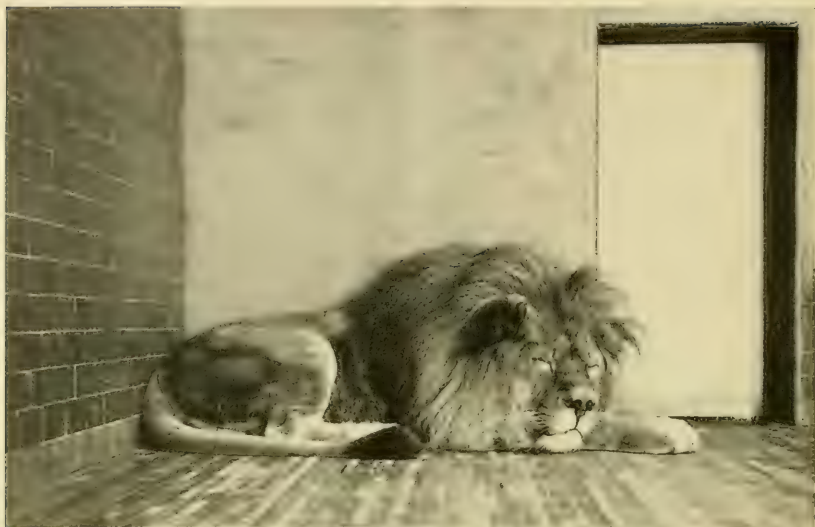
SENTINEL LION, NOW BEING CARVED IN PINK TENNESSEE MARBLE.

Reproduced from Sculptor's Model.

Copyright, 1902, by Eli Harvey.

ing spring. A photograph of one of these is reproduced herewith.

Altogether, the animal sculptures of the Lion House embrace four sentinel lions, seven life-size lion heads, seven life-size tiger heads, and thirty-eight heads of smaller carnivora in the cornice. From whatever point this building may be viewed, its purpose will be quite apparent.



"HANNIBAL"

Gift of Mr. Andrew Carnegie

THE ANIMALS OF THE LION HOUSE

THE procuring of a collection of lions, tigers, leopards, and other large felines, suitable to display in a lion house costing \$150,000, is no child's play. Manifestly it will not answer to exhibit third-class animals in a first-class building. The erection of any particularly fine structure for wild animals inevitably sets a pace for the animal men of the Zoological Park that is decidedly warm. The specimens exhibited must, in size and quality, be equal to the best found elsewhere; they must be abundant in number, and they must also be kept in good health.

In more senses than one, Carl Hagenbeck—the king of animal dealers—is the friend of zoological garden directors. But for his far-reaching enterprise, backed by genuine enthusiasm in his work, the task of stocking zoological garden installations would be far more serious than it now is.

When it became necessary for the Executive Committee to take up the question of providing a collection for the Lion House, it was decided that the Founders and Patrons of the Society should be invited to contribute sums of money with which to purchase animals to take their places in the collection as individual gifts. A list of the animals desired, and their probable cost, was prepared and sent

out, with a suggestion that anyone desiring to contribute to the collection should choose his gift, and provide for its purchase. This happy thought met with prompt and generous response, and as a result, every animal in the Lion House collection is the special gift of some individual member or friend of the Society.

Believing it unwise to attempt to purchase this important collection by correspondence, the Director of the Park was instructed to visit all the principal dealers and zoological gardens of Europe, personally inspect all feline animals offered for sale, and make such purchases as circumstances seem to require. Accompanied by Mr. W. W. Niles, the Director sailed for Europe on August 16th, and visited the gardens and dealers located at Liverpool, Manchester, London, Rotterdam, Amsterdam, Hanover, Aachen, Hamburg, Berlin, Frankfurt, Cologne, Dusseldorf, and Antwerp, with the following results:

In London, the Society's representatives purchased one clouded leopard and two snow leopards; in Antwerp, one Senegal lioness; in Hamburg, five lions, two tigers, two black leopards, one African leopard, and one jaguar. In Berlin, the only cheetah procurable in Europe was purchased of the Berlin Zoologi-

cal Gardens, whose director, Dr. Heck, kindly consented to sell it as a favor to the New York Zoological Society, but for no other reason.

In addition to these purchases, several other specimens were, at various times, obtained from other sources. At the opening of the Lion House the collection, as a whole, stands as follows:

A magnificent pair of Barbary lions, equal to the finest to be found in captivity anywhere, are the gift of Mr. Nelson Robinson. The male of this pair, named "Sultan," is four years old, and is as handsome a lion as ever trod a cage floor. He is as good-tempered as he is handsome, and his mate—an Abyssinian lioness named "Bedouin Maid"—is a model fit to represent her sex in any studio. On December 1st, "Bedouin Maid" gave birth to five cubs, in her traveling cage, temporarily quartered in the large room of the Elk barn, while awaiting the completion of the Lion House. These two animals were sold on the express condition that all cubs from this pair which might in the future be subject to sale by the Zoological Society should first be offered to Mr. Hagenbeck. This is the best possible evidence of Mr. Hagenbeck's estimate of the qualities of these animals. The mother is not only handsome, but she is what breeders call a "good mother," and able to rear her cubs without assistance.

Another very fine Barbary lion, with a particularly luxuriant mane, is the gift of Mr. Andrew Carnegie. This specimen, which is named "Hannibal," is eight years old, and in every respect is a fine model. It was said at Mr. Hagenbeck's establishment that he had developed the habit of posing in the center of his cage for admiration. "Hannibal's" mate is named "Cleopatra," and comes as the gift of Mr. O. H. Payne.

A lusty young Nubian lion, "Dongola," between two and three years old, was purchased at the request of Mr. Cleveland H. Dodge, and stands as his gift. This animal represents the short-maned type of lion, and renders the collection of lions quite complete.

The sixth lion is a beautiful female, about a year old, imported from Senegal, West Africa, and presented by Mr. Philip Schuyler. This animal is named "Sandibel," and between her affectionate disposition and beauty of form is already a prime favorite with the animal men.

The finest pair of tigers found for sale in Europe come as the gift of Mr. Charles T. Barney. They are from Northern India, and although they are now of fine size, they are only two and a half years old, and have not yet attained their full stature. They are

very handsome animals, and when fully adult, will be exceptionally large. These two specimens are named, respectively, "Rajah" and "Ranee."

A pair of Siberian tigers have been ordered as the gift of Mr. O. H. Payne; but owing to the great difficulty of procuring this very rare variety, specimens have not yet been secured. The Siberian tiger is the largest, most costly, and most sought-for feline animal, and the number in captivity is very small. Knowing the difficulty of procuring Siberian tigers, an order for a pair was placed over one year ago.

A very strong and vicious tiger cub, one year old, is the gift of Master Henry Fairfield Osborn, Jr. It came from Singapore, but from the length and abundance of its hair, it seems quite probable that it came from much farther north. It is possible that this specimen came down to Singapore from some portion of China, and if this proves to be the case, this specimen will be particularly interesting.

In the interior of Paraguay, Mr. William Mill Butler, of Philadelphia, secretary of the Paraguay Development Company, brought about the capture, about one year ago, of an animal that is certainly one of the largest and finest jaguars in captivity. With infinite pains, Mr. Butler received this animal in Asuncion, and brought it with him to Liverpool, where it was boarded in Cross's wild animal establishment for three months, and finally shipped to New York. This animal was presented to the Society by Mr. Butler, and until quite recently it has been kept in temporary quarters. The name of this fine specimen is "Lopez."

A beautiful and fully adult specimen of the cheetah, or hunting leopard—for some reason now quite rare in captivity—is the gift of Mr. Jacob H. Schiff. The procuring of this specimen required a special effort, as no representatives of this species were found in the hands of any of the dealers in live animals, and this example was secured through the goodwill of Director Heck, of the Berlin Zoological Gardens.

The two snow leopards—rarest of all the large feline animals—which were engaged in London, to be shipped from Calcutta, have not yet arrived, but are supposed to be somewhere between Calcutta and New York. These specimens are the gift of Mrs. Emma B. Auchincloss, and if they reach New York alive, will constitute the third and fourth specimens now to be seen in captivity. The other two are at London and Berlin.

Mr. William D. Sloane presented a pair of jet black leopards, from the Malay Peninsula, which are not quite so savage as black leop-

ards usually are. A Manchurian leopard, imported by way of Shanghai, and representing the most northern form of the leopard of Africa and India, is the gift of Mr. Philip Schuyler. It is of special interest for comparison with the leopards of Africa and India.

Mr. Frederick L. Eldridge has presented a

male African leopard, which will, if possible, be installed as a cage-mate for the female Indian leopard presented by Captain Thomas Golding. The clouded leopard died before reaching New York, and the female jaguar met her death in a most tragic manner, as will be noted elsewhere.



NEW YORK AQUARIUM.

THE NEW YORK AQUARIUM

IN this issue of the *Bulletin* the Zoological Society calls attention to the enlargement of its field of usefulness.

The City of New York has ceded to the Society its great Aquarium in Battery Park, with a view to placing that institution under a management that will be sincerely devoted to conducting it for the best interests of the people.

The Society will proceed at once with its improvement as a place of recreation for the public, and with the development of its possibilities along educational and scientific lines.

The exhibits of the New York Aquarium have always been free to the public, and few institutions have been more popular. Its attendance throughout the year averages over 5,000 persons daily.

The building itself is one of the few historic structures remaining in New York. Built in 1807 as a fort, it was known as the Southwest Battery. After the war of 1812, it was called Castle Clinton, and in 1822 was

ceded by the Government to the City of New York, when it soon became a place of amusement and was known as Castle Garden. Lafayette was received there in 1824, President Jackson in 1837, President Tyler in 1843, and Louis Kossuth in 1851.

It could seat 6,000 persons, and 4,000 more could find room in it. Jenny Lind began singing there in 1850. From 1855 to 1891 it was used by the Bureau of Immigration as a landing station for immigrants.

The Aquarium contains seven large floor-pools and 94 wall-tanks. The largest floor-pool is 38 feet in diameter, the six smaller pools, oblong in shape, being each 28 feet in length. The wall-tanks, divided between the ground floor and a circular gallery running nearly around the building, vary in length from 3 feet to 7½.

The laboratory of the Aquarium contains many small self-sustaining tanks or balanced aquaria.

The collections of the Aquarium are about evenly divided between fresh and salt-water

species. It has not only the largest single collection of living fishes, but a finer collection of tropical fishes than is to be found anywhere else.

Its extensive steam plant maintains warm water for tropical species in winter, and operates a refrigerator for northern species in summer.

Up to the present time it has been maintained chiefly as a fish aquarium, and it is now proposed to make extensive additions of both fresh and salt-water invertebrate animals.

There are usually over 150 species of native and tropical fishes on exhibition. Two pools are devoted to seals, and there is also a collection of fresh and salt-water turtles.

The New York Aquarium was opened to the public in 1896, and has since been under the control of the Park Department. Dr. Tarleton H. Bean was the first Director, remaining in office until 1898, when he was superceded by Colonel James E. Jones, who was in charge until 1902.

The idea of placing the Aquarium under the control of the New York Zoological Society originated with Mr. William R. Willcox, President of the Park Board, who suggested its transfer to the Society. The additional care and responsibility for the scientific and exhibitional administration was not at first welcomed by the officers of the Society. The Executive Committee, however, finally voted to accept this trust from the city as an evidence of the confidence of the municipal authorities in the management of the Zoological Park by the Society.

The necessary legislation was obtained in Albany, and after lengthy negotiations, a contract was entered into between the Society and the City, acting through its Board of Estimate and Apportionment, for the transfer of the institution in question to the New York Zoological Society.

The officers of the Society spent much time in the careful consideration of various candidates for the office of Director, and the choice finally fell upon Mr. Charles H. Townsend, late of the Fish Commission at Washington. Mr. Townsend entered the service of the United States Fish Commission in 1883, and was engaged in salmon propagation in California for two years. He accompanied the United States Steamship *Corwin* as naturalist on the arctic expedition of 1885. He was appointed naturalist of the U. S. Fish Commission's Steamship *Albatross* in 1886, and was engaged in the survey of ocean fishing banks, and in deep-sea investigations with that vessel in the Atlantic and Pacific oceans more or less regularly until 1896, when he was appointed by President Cleveland a

member of the Bering Sea Fur-Seal Commission of 1896-97. He was chief of the Fisheries Division of the United States Fish Commission from 1897 to 1902, when he was sent by the State Department to The Hague as a fishery expert in the arbitration of sealing and whaling claims against Russia. He is a member of the Washington and the New York Academies of Science, and of the American Fisheries Society, and is the author of numerous government reports on the fisheries, fur-seal industries, natural history, and deep-sea exploration. Taking advantage of Mr. Townsend's presence at The Hague arbitration, the Society sent him on a tour of inspection through the various public aquariums of Europe, and especially to the celebrated institution at Naples. A full report of his aquarium studies abroad will appear in the annual report of the Society.

The transfer of the Aquarium to the Society took place on the 31st day of October, 1902; Mr. Willcox representing the City, and Professor Henry F. Osborn representing the New York Zoological Society. The Director was installed and is now engaged in the performance of his duties.

Under the direction of the Society and with an adequate maintenance from the City there is no reason why the New York Aquarium should not become the most important—as it is already the largest—public aquarium in the world.

The Society intends not only to increase the attractions of the Aquarium as a place of entertainment for the people, but to develop its possibilities along educational and scientific lines as well. The beautiful invertebrates to be found all along our coast will be collected in large quantities for the double purpose of varying the exhibits at the Aquarium, and for supplying biological material for nature study in the public schools. The latter feature is one in which members of the Board of Education have already expressed a great interest, and there seems no reason to doubt that the New York Aquarium will soon occupy an important place as an educational and scientific institution. The Society has reserved two half days, the forenoons of Monday and Thursday, during which the Aquarium is closed to the public, and its facilities placed at the disposal of the City schools for educational purposes. Teachers with their classes are already beginning to avail themselves of its collections. The members of the Society are also entitled to admission on these mornings, a privilege which it is hoped they will appreciate.

The Director is establishing a fish hatchery in one of the large floor-pools of the build-

ing and will probably have it in operation early in January. In this work the co-operation of the National Fish Commission has been promised, and it is expected that the eggs of our more important food fishes can be seen in process of development during about eight months of the year. Two practical fish-culturists from the government service have been added to the Aquarium force, and will give more or less instruction on fish propagation to those who may be interested in this modern science that has already been of vast benefit to our national fishery resources. Fish eggs will be available to students for embryological study and the general public will undoubtedly be interested in the process of raising fishes from eggs.

A system of elaborate transparent labels is being installed, and the number of small balanced aquaria in the laboratory will be increased at once for the benefit of students in elementary natural history.

The building has been examined by architects with a view to remedying, as soon as possible, its defects in lighting and ventilation, and a plan for beautifying the general interior of the building is being worked out.

The Director proposes lining most of the exhibition tanks with natural rock-work, and supplying them with marine and fresh-water plants, so that the fishes and invertebrates generally may be viewed with natural backgrounds. Such accessories give the aquarium

at Naples and other aquariums in Europe a charm which the New York Aquarium lacks.

A working library on marine and fresh-water life generally will be provided at once for the use of students, and a photographic-room is being constructed for the purpose of making good pictures of aquatic animals.

The Director announces that a competent aquarist will be detailed to establish small fresh- and salt-water balanced aquaria in such public schools as will provide their classrooms with aquarium jars for that purpose.

The Director will soon begin the preparation of a guide-book which, it is expected, will be not only a catalogue of the collections in the Aquarium, but a useful book on aquatic nature study.

The Aquarium will continue to be open every day in the year, including Sundays and holidays from 10 A.M. to 4 P.M., except on the forenoons of Monday and Thursday. When a national holiday falls upon either of these days, the doors will be opened to the public generally.

Now that the management of the Aquarium is among the functions of the Zoological Society, it is hoped that its membership will be increased, and therewith its strength for what it represents in civic usefulness. Application for membership may be made at the office of the Aquarium, at the Zoological Park, or at the offices of the Society, 11 Wall Street, New York.



MAIN HALL, NEW YORK AQUARIUM.

ZOOLOGICAL SOCIETY BULLETIN

No. 9

PUBLISHED BY THE NEW YORK ZOOLOGICAL SOCIETY

APRIL, 1903

THE IMPROVEMENT OF THE AQUARIUM

THE New York Aquarium building, while having many serious defects, is by no means ill-adapted to the purpose for which it is now used.

As the public aquarium is comparatively a modern institution, it may be that the ideal aquarium building has not yet been designed. The Director visited during the past summer the principal aquariums of Europe, and, comparing the New York Aquarium with other institutions of the kind, is inclined to

the opinion that a circular building, with an exhibition hall, like that of the New York Aquarium, is more satisfactory than one whose collections are arranged along narrow corridors, like those of European institutions. The exhibition hall is much more spacious than that of any other aquarium, and with its large pillars, arches, lofty dome, floor pools, and balcony produces on the whole an excellent effect. Its exhibits, although not so attractively installed as in



CENTRAL PORTION OF EXHIBITION HALL, NEW YORK AQUARIUM

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most European aquariums, are very good. While the exhibition-tanks are smaller than those found elsewhere, they contain a much larger collection of fishes, there being usually about 150 species on hand.

With suitable decoration of the interior walls, and the construction of more natural backgrounds for the collections in the tanks, it can be made the most attractive aquarium in the world.

Considering the fact of its large attendance—about 5,000 persons daily—its improvement as a place of recreation for the people should not be delayed.

LIGHTING.

One of the most serious defects of the building is the lack of light, which is apparent not only on the main floor but in the tanks containing the exhibits. When a



SERVICE GALLERY.

sufficient amount of light can be admitted to the tanks to permit of the collections being viewed clearly and distinctly, and the light on the main floor increased, a most decided improvement will be observed. The large central dome is so constructed that but little light now reaches the central floor pool, which ought to be made one of the most attractive features of the building.

The accompanying photograph of the service gallery, giving a rear view of the exhibition-tanks on the balcony and main floor, shows the extremely small size of the over-

head skylights. These skylights are so small, and placed so high above the collections, that the latter are never seen with sufficient clearness.

The building, originally a fort and having walls some nine feet thick, has to be lighted from above. The light is, in fact, so inadequate that attempts to maintain water-plants in the exhibition-tanks have failed. The new plans for lighting the Aquarium provide for fully three times as much light as is now admitted. This, it is believed, will show the exhibits with perfect clearness, and permit the introduction of both fresh and salt water plants.

When a sufficient amount of light is secured it will be possible to remove the present lining of white tiles from the exhibition-tanks and replace them with rockwork, so that the charming effects for which the Naples Aquarium is noted can be reproduced at New York. An attempt has already been made to change the lining of the tanks, and the results are such as to show that an important change can be made in this respect. This work has been delayed until a supply of more suitable rock can be secured.

The decoration of the interior walls is a matter of great importance. The present interest which the interior of the Aquarium has for the visitor lies almost entirely in the collections exhibited, while the spaciousness of the exhibition room is lost owing to the total absence of decoration. A scheme of coloration for the interior is now being worked out, and with the introduction of light and the tinting of the walls and pillars the interior can readily be transformed into a very beautiful audience room.

WATER SUPPLY.

The New York Aquarium, being supplied with salt-water from New York Bay, is placed at a serious disadvantage when compared with foreign institutions, and next to the securing of the proper amount of light a new water supply is probably what it stands most in need of. The salt-water collections of European aquariums are maintained in pure sea-water stored in large reservoirs, and the collections can be viewed through a medium of transparent clearness, a condition totally different from that obtaining at New York. The system of "closed circulation"—by means of stored sea-water—should be introduced without delay. By this method alone can clear water and constant temperatures be secured. Closed circulation has been employed by the United States Fish Commission in the aquariums maintained at the vari-

ous great expositions which have been held in different parts of the United States during the past ten years. The cost of maintenance is also greatly lessened in winter, as the constant heating of a large body of water involves a serious expense. At the New York

The Director has given constant attention to the defective piping of the Aquarium, and recent modifications have been made which have resulted in a saving of 50 per cent. in steam used for heating water for the tropical collections. The salt-water warmed for



FISH HATCHERY, NEW YORK AQUARIUM.

Aquarium the water pumped from the Bay daily during the winter months at a temperature of about 34 degrees requires to be heated to 70 degrees before being supplied to the tanks containing the tropical collections, and this fact, together with the necessity of heating the building and operating the pumps, has kept the boilers under a constant strain.

One European aquarium, that at Brighton, containing a much smaller collection of fishes than the New York Aquarium, has reservoirs storing 500,000 gallons of water. But one-fifth of this amount would be necessary for our Aquarium.

Another great advantage to be derived from pure sea-water would be the possibility of keeping many forms of invertebrates which cannot be maintained in the brackish water which it is now necessary to use. From the open coast many interesting animals have been introduced during the past three or four months which survived less than ten days under the conditions prevailing here.

the use of the tanks on the balcony is now made to flow into the lower series of tanks. The changes in the salt-water circulation have resulted in a saving of more than 40 tons of coal per month during the winter season, and one large circulating pump now serves to do the work for which two were formerly required. Where machinery is concerned all small improvements in operation result in an important lessening of the cost of maintenance in general. A further saving of heated water is being arranged for, so that the supply heretofore wasted from the lower wall tanks can be turned into the large floor pools before it is finally allowed to flow to the sewer pipes. Early in November it was found possible to stop one of the two pumps used to feed the boilers by introducing certain piping to connect the water main with the pump returning the water from the radiators to the boilers.

The Croton water used in the Aquarium to supply the fresh-water tanks is so murky at times that it should eventually be discontinued and a permanent stored supply used

instead. In the meantime it is being cleared somewhat by the use of alum, and a less amount will be passed through the filters by supplying the feed-pipes to the tanks with small jets, which will secure an amount of aeration hitherto secured by a stronger flow of water.

The ventilation of the Aquarium building, while not a very serious matter during the winter months, will require attention in summer, when larger crowds visit the building, and can be greatly improved by the introduction of electric fans.

The collections should be made much more instructive than has been possible by the present system of labels. Transparent labels are now being introduced, which will, when completed, give to visitors considerable information on each species exhibited and can be read without strain to the eyes.

In order that the Aquarium may have a constant supply of local fresh and salt water fishes, a field collector has been added to the force, who will also be able to supply an important amount of the material used in feeding the collections in general.

FISH HATCHERY.

A fish hatchery has been installed in one of the floor pools of the Aquarium, which has proved a most satisfactory addition to its attractions. It has a capacity of about two million fish eggs at one time, and hereafter visitors will be able to see many species of our native food fishes being hatched artificially in season. The accompanying photograph shows the hatchery in working order. Its apparatus is placed on the broad stone coping of the pool, and embraces that customarily used in modern fish culture. Three hundred thousand fish, including five different species, have been hatched out successfully. Through the co-operation of the United States Fish Commission and the New York State Fish Commission, the hatchery is operated without expense to the Aquarium, the young fish being planted in State waters.

A LARGE SNAPPING TURTLE.

The Aquarium received a specimen of the alligator snapping turtle (*Macrochelys temminckii*) early in December, which promised to be a very interesting addition to its collections, but the animal arrived in such an emaciated condition that it could not feed, and it soon died. The alligator or southern snapping turtle is very much larger than the northern species, sometimes reaching the weight of 150 pounds.

The heavy eggs of trout and salmon are hatched in the troughs at the side of the pool, while the semi-buoyant eggs of whitefish and shad are placed in the McDonald jars mounted at the north end. Boxes are provided at the opposite end for young fish during the period of absorption of the yolk-sac, and the pool itself will become a rearing-pond for fish as soon as they are old enough to begin feeding.

The first fish eggs received (14,000 eggs of the rainbow trout) were placed in the hatchery early in January, and were all hatched within a month, the loss during incubation being less than 300. The young fish were passed into the rearing boxes, and the hatching-trays filled with eggs of the brown trout. The period of incubation of the rainbow trout is 45 days, with a water temperature of 50 degrees, and the young fish in the rearing boxes should absorb the yolk-sac in about 30 days at the same temperature. The brown trout were hatched out by the 7th of March, the loss amounting to practically nothing. Fifty thousand lake-trout eggs were then placed in the hatching-trays. Shad eggs are being procured and the exhibition of fish hatching is assured for about eight months of the year. The hatching-jars were filled with 275,000 eggs of the whitefish, all of which have hatched out, a portion of the young fish being still on exhibition. Since the installation of the hatchery it has been constantly surrounded by visitors, who have been greatly interested in seeing the young fishes in various stages of development, and have asked the attendants many questions respecting the methods of modern fish propagation.

There is no reason why the Aquarium hatchery should not be a local school for fish culture. America leads the world in this modern science, and the Government plants more than nine hundred millions of young fish in our waters every year. This important work is also supplemented by the various state fish commissions throughout the country.

This specimen was $4\frac{1}{2}$ feet long, measured from the snout to the end of the tail, and weighed $106\frac{1}{2}$ pounds. It must have weighed very much more when in good condition, and appeared to have the marks of great age. The large inner claws of the fore feet were worn nearly off. It was secured in the city markets, and was said to have come from Memphis, Tenn.

The specimen has been mounted as a trophy for the Aquarium.



SPINY LOBSTER.

BERMUDA FISHES

HOW THEY ARE BROUGHT TO THE AQUARIUM

BY PROFESSOR CHARLES L. BRISTOL,

OF THE NEW YORK UNIVERSITY.

PERHAPS no feature of the New York Aquarium differentiates it from the other large aquariums of the world more than the wide area from which it draws its specimens. While those of Europe draw their supplies from the nearby coast waters, this one covers the Atlantic Coast from Florida to the Gulf of St. Lawrence, and draws upon the fresh waters of the Alleghany slope, the Great Lakes, and the valley of the Mississippi River. This extensive area includes wide variations in temperature, of habitat, and other conditions that influence the life of its fauna, yet the New York Aquarium provides for all these, from the salmon that requires water at a temperature of 55° F. to the tropical fishes that require a temperature of 70° F.

The tropical fishes brought from Bermuda attract the attention of every visitor to the Aquarium by their rich colors and graceful

forms. They bring the brilliancy of the coral-reefs to these sombre northern latitudes and open out a new range of beauty quite different to that of our familiar coastwise fishes.

Besides the novelty of form and brilliancy of color, another feature, that of rapid and wide change of color, adds to their charm. Stand in front of the groupers a few moments and study one individual. He will, probably, change from a plain even-colored gray to bands of black and white; the blue parrots make similar changes, and the yellowtails change so completely and so suddenly as to look like totally different fishes.

The angel fishes are, perhaps, the most noticeable, with their long yellow streamers floating back from a sky-blue body; the squirrels, in bright scarlet livery and huge eyes, contrast strangely with the angels. The hinds hug the bottom, and well repay a



STRIPED GRUNT.



BERMUDA GROUPER.

few moments' study, for they change colors at frequent intervals, as do the wide-mouthed groupers. The parrots are as gaudy as their namesakes, and as varied in their colors and ornamentation. The dainty butterfly fishes are sometimes called "four-eyes," on account of the eye-like ornament on either side near the tail. It looks enough like an eye to be one, and deceives many persons, as it did one who came to me in Bermuda one day and asked if I had seen a fish that always swam tail first. They flit in and out among the caverns and nooks of the reefs, and probably owe their lives to their disguise, for a fish always seizes his prey by the head; in this case it would be by the tail, which allows the little fellow a chance to dart away.

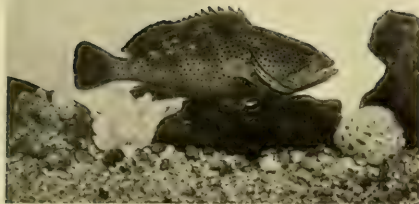
The queen trigger-fish is in many respects far and away the handsomest of these fishes. It is a strong, vigorous fish, flat-sided and deep from above downward, with almost all the colors of the rainbow on his body, and over these black lines suggestive of a huge bridle on his head. All the fins have long velvet-black streamers, that fly like pennons as he swiftly swims about the tank. These are very rare in Bermuda, and for three seasons the fishermen kept a faithful lookout for them before bringing one in.

The morays are marine, eel-like fishes, and while the smaller speckled morays are beautiful in their bright spangled liveries, the great green morays, from six to eight feet long, inspire respect from their ferocious aspect. Said one of the "Mudian" fishermen, when I asked him to bring one to me alive and unhurt: "Why, sir, if I saw a green moray coming up one side of my boat I'd jump off the other side as fast as I could." But he finally brought me several specimens.

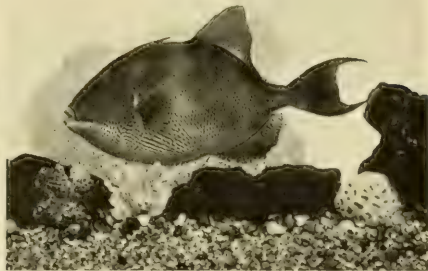
The doctors are shaped like a melon-seed, and have a curious lance-like weapon on each side of the tail, whence they derive their name. The little sergeant-majors are branded with black and yellow, and are very conspicuous on the reefs. Lack of space prevents even a mention of the names of the other forty or fifty varieties of tropical fishes, each possessing some feature of interest.

Tropical fishes were first shown in New York in the old Barnum Museum, at the corner of Broadway and Ann Street, and they were brought there from Bermuda by one of the members of the New York Zoological Society, Mr. William E. Damon, whose story of his trials, crowned finally by success, sounds like the story of one of the labors of Hercules. They were advertised in the true Barnum style, and proved a great drawing-card, as they do to-day in the Aquarium at Battery Park.

The fishermen catch the fishes out on the coral reefs, where the water is clear as crystal, and where the plants and animals make a gorgeous rainbow display of color, of which the fishes form a harmonious part. They use traps or pots made of poultry-fence wire, and patterned after pots made two hundred years ago of cedar twigs and palmetto-leaf fibres. They bait the pots with "black shells" (small mussels), pounded fine, damaged salt codfish, or crushed crabs or lobsters. They haul twice a week, and bring their fish alive and uninjured to the docks in well-smacks and dress them as they sell them. We have our headquarters on a little island in the harbor of Hamilton, which the boats pass as they come in. As we spy them we make out to them in a rowboat with a large tank in it. If they have caught anything curious or rare



SPOTTED HIND.



TRIGGER FISH.

we get a merry hail to come abroad and transfer the catch to our tank. We separate the various sorts into different tanks or cars at our dock, for unless we respect "compatibilities" we shall have a high mortality rate during the first twenty-four hours. One angel among thirty other fishes will play havoc with the lot. We have learned after sad experience just what kinds will live in harmony, yet every now and then some especially vigorous individual will undertake to "master" the lot to our sorrow. One very notable instance of this was an angel fish not very large, that killed every fish put in with him. He was a beauty, and lived four years in confinement. After selecting only the most vigorous and perfect individuals we lose about 20 per cent. of all we buy, for a scared fish is usually a dead fish at the end of the third day. This sorting, however, insures good stock for the voyage and for the Aquarium, and in the end is profitable.

While they are awaiting shipment they are well fed, some grow strong and hearty, while others show weaknesses, and are culled out.

When sailing day comes it means a hard day's work before breakfast for all hands. The shipping-tanks are given a final cleaning, the stock is critically examined, the transfer to the tanks, now loaded on a launch, is made with care, we steam across the harbor and come alongside the steamship, where the mate hoists the tanks and stows them on deck, while the carpenter blocks them snugly against a possible storm. The engineer has set his pump going, a stream of salt water is carried to each tank, and continues to flow

until the ship is tied alongside the dock at New York. Some of the fishes, strange to say, show evidences of sea-sickness on the first day out, but recover quickly. Everyone on the steamer takes an interest in the live cargo, and not a little of our success is due to the officers of the Quebec Steamship Company's boats, who have co-operated with us at all times. The whole work is so well systematized now that the loss in transportation rarely exceeds two per cent. of the cargo. This is the more remarkable when it is realized that the boat leaves the warm waters of the Gulf Stream about two hundred miles before it reaches port, and the ocean temperature then suddenly drops 20° F. Nothing but first-class hearty stock can survive the sudden change. The director of the Aquarium has provided an air pump for future shipments, so that aeration can be supplied without the pumping in of cold water.

It is interesting testimony to the superiority of the backboneed animals that we have never been able to bring any of the invertebrates in good condition to the Aquarium, though we have tried repeatedly. The sudden drop in temperature is too much for them. The curious "Bermuda Lobster," really a gigantic crayfish, lives for a week or so, but in a sluggish, half-hearted way. It should be a source of gratification to the members of the New York Zoological Society that plans will be put into operation this season which promise to make it possible to show in the Aquarium some of these exceedingly beautiful and hitherto unknown animals without backbones.

A NEW WAY OF COLLECTING RARE FISHES.

A most interesting collection of tropical fishes has just been brought to the laboratory of the Aquarium from the Tortugas Islands, off Key West, Fla. The specimens are remarkably well preserved, and were collected during the past winter by Dr. J. C. Thompson, of the United States Navy, who has been attached to the Naval Station located there. His studies have resulted in adding about 150 species to the number already known from that locality, and there are several forms in the collection new to science.

The fish life of the Tortugas, lying on the border of the Gulf Stream, is of a richness probably surpassing that of any region within the United States proper. The water is of the characteristic tropical clearness which enables the bottom to be seen plainly through a water-glass to the depth of five or six fathoms.

The actual observation of marine life among the sea-weed and in the crannies and nooks of the coral reefs is a revelation to one unacquainted with the conditions to be found in such places.

As no small part of the success in capturing the rarities from the Tortugas was due to a small electrical fishing appliance devised by Dr. Thompson, he has been asked to prepare the following account of his fish-catching experiments in those waters.

It may be explained that the water-glass to which he refers is simply a small box, or a bucket, with a glass bottom. When the glass is placed on the surface of the water fishes and other objects can be seen perfectly. It is used by pearl-divers, sponge-gatherers, and by fishermen generally in tropical waters:

"After spending several months collecting in the Tortugas and employing the routine methods for taking fish—the hook and line, baited trap, seine, cast-net, and dynamite—there still remained the records of many fishes seen, but which had avoided capture, and to these forms all possible attention was given. One in particular, a magnificent specimen of *demoiselle*, dark brown with sapphire specks on back of head, and a bright orange tail, lived for over three weeks in a small cave under a coral ledge. This fish could be approached to within a few feet, and could with patience almost be touched with the rim of a dip-net, but any sudden motion would cause him to dash out of reach among the rocks. These prohibited the use of nets

in any form, and no bait could tempt him, as his appetite was appeased by nibbling something among the sea-weed that grew in abundance. When watching this fish, attention was drawn more and more to the trait that seems to be abnormally developed in many fishes—curiosity. He would approach and examine, apparently with no small interest, one's limbs and shoes, while the net and any bait that was dangled before him he carefully scrutinized. To obtain this fish it seemed necessary to devise a little piece of explosive bait, that could be controlled so as to be fired at an instant when he was within a few inches, and to so stun him that he could be taken in a dip-net.

"Such an apparatus can be used with perfect success when wading in shallow water which is sufficiently clear to allow the fish to be seen prior to capture. A small dry-cell storage-battery was carried in a pouch snugly fastened under the left arm. From this led a couple of insulated wires, twisted into a single strand about a yard long, and connected by thumb-screws to two pillars of a simple circuit-key, screwed into the side of a water-glass near the rim, and in such a position that it could be opened or closed with one finger of the hand holding the glass. Beyond the key was a two-ply strand of waterproof insulated wire, about ten feet long, terminating in a small fulminate cap, such as is used to explode charges of dynamite. The method of operating it is as follows: When all electrical connections are made and the key open, the wire is coiled and hitched alongside of the water-glass, which is floated on the surface of the water and looked through as one wades cautiously about. When the fisherman comes to a spot such as experience alone will tell to be a propitious one, and sees a desirable fish the coil of wire is freed, and a couple of turns taken about midway between key and bait around the tip of the handle of a dip-net, which thus reversed is used temporarily as a fishing-pole. The bait is lowered slowly into the water, and maneuvered until it is about a foot from the specimen, and the key is then instantly closed. The resulting explosion will either kill or stun practically every fish that may be encountered under these circumstances. The wire is now slipped from the net, which can be freely used. The wire can be stored in the pouch for use later, or a fresh cap can be attached and the process repeated as long as the ammunition holds out.

"Having the wire detachable from the key on the water-glass enables one to stow the

electrical outfit—battery, wire, and ammunition—in a small package, weighing but a few pounds.

"For working from a boat in deep water the cap can be made to sink by weighting, and it may be made attractive to some fishes by tying a bit of bait around it, or it may be hidden in a ball of sea-weed, lest it frighten others.

"The majority of fish killed in deep water do not rise. Where the depth is such that a bamboo pole with a small net cannot be made to reach them, a sort of grapnel can be made of a number of large-sized fish-hooks, tied at random to an irregularly shaped sinker, in which, with a little patience, they can be entangled and brought to the surface. For taking small fishes in shallow water this device is much superior to dynamite. It avoids the slaughter of many hundreds of specimens that are not desired for the collection, and does not roil the water. Many valuable specimens are lost by sinking when killed, and being either carried away by the tide or drifted into some inaccessible crevice, or by being completely buried by the fine sand and mud stirred up by an explosion.

"Again, among coral reefs the struggle for existence is at its highest pitch, and rarely can a fish lie in the water many moments without being eaten. One of the rarest captures was found less than ten minutes after an explosion in the possession of a large rock-crab, who was gravely holding it in his left claw, pulling its tail off and stuffing it into his mouth with his right.

"The student of marine life in tropical waters who adds to his outfit a small electric fishing device is assured of new experiences and rare specimens."

THE BELUGA OR WHITE WHALE.

(*Delphinapterus leucas*.)

Visitors to the Aquarium frequently inquire about the "White Whales" that were once an attraction of the place for a short time.

The photograph presented here shows the appearance of the animals so well that it seems desirable to give some account of them.

Two specimens that were procured on the Rivière du Loupe, Canada, were placed in the large center pool at the Aquarium June 5, 1897.

The larger of them, a female, about ten feet in length, was injured in transportation and lived but five days.

The smaller one, a male, nine feet long, was losing

its epidermis when received at the Aquarium, and soon after its arrival large fragments of its outer skin were found in the water. In a brief time the skin-shedding process was complete, and the whale was much lighter in color than before. This specimen was fed with live eels, and spent most of the time chasing and catching them. It swam round the pool always in the same direction, never turning backward. This is said to be its habit in captivity, and has been observed before.



WHITE WHALES—RIVIÈRE DU LOUPE, QUEBEC.

The Aquarium specimens were captured in the usual way in one of the white whale fisheries of Canada. A place is chosen where at low tide the bottom is bare, or nearly so. Long poles are driven into the sand, a short distance apart, enclosing a considerable area, except at a point where the water is deep, and the Beluga enter the trap in pursuit of herring. The fishermen with their boats follow up the school, and by their presence keep them from returning. It is said that the Beluga makes no attempt to pass the slight barrier of poles. When the tide flows out the whales are grounded and are readily killed.

The two brought to the Aquarium were placed in large, strong boxes, the bottoms of which were covered with seaweed several inches deep, making a fairly soft bed. They were accompanied by an attendant, who, with a sponge, constantly kept the "blow-hole" on top of the head well moistened. The specimen that lived for several weeks in the Aquarium died from strangulation, a partly digested eel having in some way gotten into the air passage and which the whale could not eject.

The first day after these whales arrived at the Aquarium the attendance was 21,000 and for two or three following days about 15,000 a day.

The illustration shows white whales after being stranded and killed.

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PRIVILEGES OF MEMBERSHIP.

The acceptance by the Zoological Society of the management of the Aquarium adds to the special advantages of membership in the Society a new feature of considerable importance. Our members will be brought in close touch with the new institution, and through it they will become acquainted with the only class of vertebrates which is not represented at the Zoological Park.

The crowded condition of the Aquarium during the hours it is open to the public will render the privilege of a quiet and satisfactory view one which members of the Society surely will value. In order to enable members of the Society, and also a few special students, an opportunity to view the extensive collections of the Aquarium to the best possible ad-

vantage the Aquarium will be opened from 10 A.M. until 12 every Monday and Thursday mornings only to members of the New York Zoological Society who exhibit their membership tickets, or else present tickets good for entrance to the Zoological Park. In view of the fact that the building is situated so near to the most crowded section of New York the pressure of visitors is very great.

The Zoological Society desires and needs an annual membership of 3,000 persons, each paying \$10.00 per year. This would mean an annual income of \$30,000.00, to be expended chiefly on objects of special benefit to the members of the Society. In the Zoological Park it would insure the speedy erection of a fine Administration Building, the creation of a great Zoological library and picture gallery, the establishment of lecture courses, the issue of many highly desirable publications about animals, and much work of an educational and scientific character. In a very short time the special privileges accorded to members of the Society will be well worth the amount of their annual dues. It should be remembered that there is no initiation fee. Annual members pay \$10.00 on May 1st of each year, and the fee for life members is \$200.00. Every person interested in the objects of the Society and willing to aid in promoting them is cordially invited to sign an application for membership, and forward it by mail to the Secretary, Madison Grant, Esq., No. 11 Wall Street, New York City.

With this number of the Bulletin we enclose to members a slip to contain the names and addresses of friends who might be invited by the Executive Committee to join the organization. To all persons whose names and addresses are furnished by members of the Society the Committee will extend a cordial invitation, accompanied by some one of the Society's publications.

THE WEST INDIAN SEAL.

The large West Indian seal (*Monachus tropicalis*) died on the morning of January 6th, having lived in the Aquarium for a little over five and one-half years. The autopsy performed by the pathologist of the Zoological Society showed that the animal died of fatty degeneration of the heart, liver, and kidneys, a condition due, no doubt, to confinement and lack of sufficient room for exercise.

The case was slightly complicated by pneumonia just commencing in the left lung. The animal weighed 360 pounds and measured six feet eleven inches from snout to end of hind flippers. The companion of this seal lived in the Aquarium a little over two years.

Considering the conditions under which seals have to be kept in the Aquarium and the limited space that can be allowed such active animals, the specimen lived about as long as could be expected.

The loss of this seal is especially to be regretted, as the West Indian species is nearly extinct. A couple of centuries ago it was abundant in the Caribbean Sea and the Gulf of Mexico, eastward as far as the Florida Keys and the Bahama Islands. Very little has been known about it, as it was nearly exterminated about 150 years ago. Since then the few specimens that have been found have come from the Triangles, a group of islands off the coast of Yucatan; quite a number of individuals being procured in 1886, and furnished to museums in this country. In the "Natural History of Jamaica," by Sir Hans Sloane, published in 1707, it is stated that the West India seal was abundant in the Bahamas, and frequently as many as 100 were killed in a single day for their oil.

It was the slaughter of the beast for oil that led to its practical extermination. One-half century ago it still existed along the coast of Jamaica. It is known that some individuals of the race still linger on the Triangle Islands, but there is no very great likelihood that the Aquarium will be able to procure another specimen.

The seal which has just died was very interesting to those who visited the Aquarium. Her playful habit of squirting water in the face of visitors was the source of more or less amusement every day during the entire period of her life at the Aquarium. The largest specimens of this species were about ten feet long. It is considered rather remarkable that the Aquarium specimen lived so long in-doors, as the species is a tropical one, inhabiting sunny waters and leading, of course, a more or less active life in pursuit of its natural food.

It was captured at the Triangles by Captain Martin of a Pensacola schooner engaged in fishing on the Red Snapper banks off Yucatan. When secured, in 1897, about thirty animals were present on the islands, where they had probably been seldom dis-

turbed, as no difficulty was experienced in taking them.

Both of the seals of this species kept at the Aquarium learned the trick of throwing water at visitors, the last one living long enough to become well known.

Nellie had always fed freely and lived in apparent comfort and contentment.

THE TUAMOTU PEARL FISHERY.

In a lecture recently delivered before the Geographical Society of Baltimore, Mr. Townsend, the Director of the Aquarium, exhibited many lantern-slide pictures of the pearl fisheries in the Tuamotu Islands, which have just been overswept by a great tidal wave.

The Tuamotu, or Low Archipelago, in the South Pacific Ocean is composed of low coral islands or atolls, in the enclosed lagoons of which the pearl fisheries are carried on. The sea overwhelmed several of the more central islands of the group, and 600 natives are reported to have perished. Mr. Townsend visited these islands as naturalist of the *Albatross*. He spoke of the loss of several old friends with whom he sojourned while studying the pearl fisheries. When at the island of Hikueru, where the greatest destruction was wrought, he found about 3,000 persons congregated there to participate in the pearl-diving industry. The bulk of the pearl shell was being taken from depths of 8 to 10 fathoms, and he observed one diver bringing up shells from a depth of 14 fathoms (84 feet), the naked diver remaining down $2\frac{1}{2}$ minutes at each plunge. Dr. A. G. Mayer, who is a contributor to this number of the BULLETIN, was present and participated in the observations, making accurate soundings to the depth of the water.

The diving is done without any diving apparatus whatever, and very few of the divers can work at greater depths than 15 fathoms. The pearl industry here, as well as in other parts of the world, is based on the taking of pearl shell, or mother-of-pearl, valued in European markets at from \$375 to \$800 per ton. Pearls are accidental growths, and are only found occasionally. They are usually secreted by those discovering them, and are disposed of privately.

The average yield of pearl shell from the Tuamotu Islands is about 500 tons a year.

As pearl shell is becoming scarce the French government has prohibited the use of the diving suits, with a view to preserving the industry for the benefit of the native inhabitants. The employment of diving apparatus results in too close a harvesting of the crop.

When the islands were overwhelmed the season's catch of pearl shell was washed away. The survivors of the disaster having lost everything, great suffering has resulted, and French warships are now transferring the pearl divers to other islands.



SALT WATER.



BALANCED AQUARIA.

FRESH WATER.

THE CARE OF BALANCED AQUARIA

THE laboratory of the New York Aquarium has a fine collection of fresh and salt water aquaria, of the kind known as "balanced," or self-sustaining. The jars are of uniform size, holding eight gallons of water. Containing plant and animal life in proper proportions as they do, the water in them is never changed. In fact, they are maintained with as little disturbance as possible, a little feeding and occasional cleaning being all that is necessary under ordinary conditions. The series as a whole presents a number of interesting object-lessons in marine and aquatic life.

As it is much visited by teachers and classes from the schools, the collection has recently been increased by the addition of several jars.

Among the forms to be seen in the salt-water jars are sea anemones, barnacles, corals, marine-worms, mussels, clams, hermit and horseshoe crabs. The opportunities which small aquaria afford for observing the natural movements of these living creatures are excellent.

Through the co-operation of the Board of Education the Director of the Aquarium has undertaken to assist the biology teachers of New York in maintaining small collections of this kind in their class-rooms, and a competent aquarist has been detailed for that duty,

the Aquarium furnishing only the animal life necessary to stock the jars. As the Aquarium now has a field collector, this can easily be done from the surplus material received weekly. About thirty aquaria have already been set up in as many high schools, but this has been done with the understanding that the Aquarium be put to no expense for jars or fixtures. The teachers have exhibited so much interest in the matter that it has been found desirable to prepare brief instructions regarding the establishment of such collections, and the proper way of caring for them.

The following directions for the care of balanced aquaria have been prepared by Mr. L. B. Spencer, who is in charge of the collection in the laboratory of the New York Aquarium:

"Probably a majority of those who keep small aquaria, with a few goldfish as inhabitants, make a practice of frequently changing a part of the water, that the fishes may not die for lack of air. If the person who cares for them forgets to change the water or does not do so often enough the chances are that some or all of the fishes may die. Then again, many people take the fishes out of the aquarium with the hands or a net, to wash the interior, putting in fresh water and then returning the fishes, and in this way the

unfortunate creatures are soon handled and washed to death.

"There are fresh-water aquaria at the New York Aquarium in which the water has not been changed for more than three years, and are at the present time in excellent condition. The loss by evaporation must necessarily be supplied by adding fresh water once or twice a week.

"Round glass aquaria (with perpendicular sides) which will hold from two to twenty gallons of water, can be bought at very reasonable prices, and for home use those holding from three to eight gallons are convenient sizes. Aquaria, rectangular in shape, with iron frames and glass sides and ends, are preferred by many. Glass globes are not at all desirable, as they are not easily kept clean and fishes do not thrive in them.

"For the bottom of the aquarium use clean washed "bird gravel," although a little coarser gravel is preferable. The gravel looks well, the plants which are necessary to maintain the balance root well in it, and it is easily kept clean. About two inches of gravel will be necessary to hold the plants down.

There are several species of waterplants which are good aerators, one of the best being a grass-like plant known as *Sagittaria*. It roots firmly in the gravel, and sends off shoots in different directions, from which new plants soon grow. *Vallisneria* is another grass-like plant suitable for aquaria. It is found in the streams in the vicinity of Passaic, N. J. Other useful species are milfoil, parrot's feather, *Potamogeton*—a common pond weed, *Anacharis* or water thyme—a profuse grower, and *Fontinalis*—a moss-like plant. *Cabomba* is a good plant for the aquarium, and can generally be procured through the year. Of floating plants there are several species, which are very pretty and are all more or less useful either to aid aeration or as a home for the propagation of myriads of minute animal forms which are food for some of the occupants of the aquarium. *Nitella* is very pretty, growing in masses, very fine and hairlike. *Riccia* is in quite general use, and thrives well. There are several species of what are commonly known as duck-weeds, which are easily procured. The ponds and brooks of the country furnish a large majority of the plants named, and there are other species of waterplants which can be found in various localities that might be good aerators, but care must be taken lest some of them make trouble in the balanced aquarium. Risks should not be taken, and it is not necessary

to use more than three or four species of plants at one time. Plants well rooted will stay down when buried in the gravel, if not, it will be necessary to wind a strip of sheet-lead loosely around the bottom of each small cluster of stalks before placing them in the gravel.

"A little rockwork will add to the beauty of the aquarium.

"It is well to exercise care when putting in the water that the plants may not be disturbed. The aquarium should stand for a day or two at least before adding the animal life, that the plants may have time to perform their work of supplying air to the water.

"There are many forms of animal life which can be collected from waters in the vicinity of New York or they can be purchased from dealers in stock for aquaria. Some of the common varieties of goldfishes are found in most balanced aquaria, and are easily kept. There are several species of the sunfish family, all of which are attractive and thrive well. The fresh-water stickleback is fairly hardy, and if well cared for will build a nest and produce young. Tadpoles are easily procured and are interesting, but the odd-acting acrobatic little newts will afford more pleasure by their comical actions than all the other inhabitants of the aquarium. Snails are desirable in the collection, as they will eat some of the small particles of food which the fishes leave. The best kind is the *Physa*, which is common and will breed in the aquarium. Another species, the *Planorbis*, does fairly well. There are other members of the snail family which may be used, but it is best to be cautious at first and not try to keep too great a variety of animals until one has had considerable experience. Never overstock the aquarium with animal life. Always have an abundance of thrifty growing plants to furnish a supply of oxygen, and the animal life will not suffer for lack of air in the water. In feeding the animal life care should be taken not to overfeed. Take time and see that the food is being eaten. If not, stop feeding, for if the water is to be kept in a healthy condition all dead matter must be removed a few hours after feeding or fouling will take place and the collection will be lost. Refuse may be removed by means of a glass tube with a hole three-eighths of an inch in diameter. Place the thumb tightly over the upper end, insert the lower end of the tube in the water over the substance to be removed, raise the thumb slightly, and the waste matter will instantly rise in the tube, when the top may be closed and the tube removed. If it is not desired to waste the wa-

ter, a small net made of cheese-cloth held over the aquarium with the left hand will of course catch the solid matter as the water falls back. The operation should be repeated until all waste is removed. It is well occasionally to aid aeration by dipping up some of the water, raising the dipper six or eight inches above the surface, and pouring it back. The stream of water will carry back air. Avoid as much as possible the disturbing of the plants. A fresh-water aquarium does not require direct sunlight.

For cleaning the inside of the glass use a long-handled pad of wood about $2\frac{1}{2}$ inches long by $1\frac{1}{2}$ inches wide and three-eighths of an inch thick, covered with two or three thicknesses of soft woolen knit goods. If the aquarium is round, shape the sides of the block to fit the curve of the glass. All *confervæ* (vegetable growth) is easily removed by rubbing the glass, and if the pad is washed often the water will not be soiled. The growth of *confervæ* on the rear side of the aquarium need not be removed, as it is a good aerator. If after several months, perhaps a year or more, the plants have grown to excess and the gravel has become somewhat foul, carefully remove the animal life to some receptacle and siphon the water into buckets. Soft rubber tubing is best for the purpose. Take out the plants, wash the gravel, and clean the inside of the glass. It is well when returning the water to raise the dipper, pouring it in as previously described, for aiding aeration. Avoid resetting a fresh-water aquarium as long as possible, as it disturbs the rooted plants. If the water is clear and the animal life appears healthy do not touch it. A few suggestions should be made as to the size and number of fishes, newts, and tadpoles which can be maintained under favorable conditions in a four or five gallon balanced aquarium. Fishes from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, three or four; newts, four or five; tadpoles, if they are not too large, three; snails, six or eight. As the newts come to the surface for air they will not therefore be a detriment to their gill-breathing companions.

A salt-water aquarium is somewhat more difficult to stock and keep in a healthy condition than one of fresh-water, but is more interesting, as there are more species of marine animals which can be procured and kept in such an aquarium. The self-sustaining aquarium is a wonderful field for the study of the smaller marine forms. In many respects the manipulation and care of salt-water balanced aquaria are similar to those of fresh-water. Use beach-gravel on the bot-

tom about one inch in depth. A part of it may be quite coarse, as small anemones will attach to the pebbles, and the bottom is easier to keep clean. It is well to place some pieces of rock in the aquarium, which will add to its beauty and make a home for anemones.

There are several formulas for making artificial sea-water, but it has never been used at the New York Aquarium. The ocean is the natural source of supply, and it would be difficult to improve on nature. The practical plant for the aeration of the sea-water aquaria is the so-called sea lettuce (*Ulva latissima*), which can be procured in tide-pools and sheltered coves near shore. Having the gravel and pieces of rock bearing anemones placed in the aquarium, carefully fill it with water, so that you do not disturb the unattached anemones if there are any. The *Ulva* grows in very thin sheets, and is extremely tender when young, therefore it requires careful handling. Use small pieces of cork to float it, allowing a portion to hang down near the bottom on the rear side of the aquarium. This arrangement forms a background, and shows the anemones and other life to good advantage. Cover about half the surface of the water with the *Ulva*, leaving the front part for light. *Solieria* is a good sea weed for the bottom of the aquarium. Its color is a beautiful red, and makes a handsome contrast to the green *Ulva*. A species of coral can be secured on the New Jersey coast at Long Branch and vicinity and in Long Island Sound which will live for years. Its tentacles expand freely, and it is very interesting. Several species of tropical coral can be kept alive for years in balanced aquaria.

Oysters, clams, and mussels can be kept with sea anemones and coral, but shrimp, small hermit, horseshoe, and blue crabs had best be by themselves, for they will rob the sea anemones and coral of their food. Of the annelida, or worm class, the *Scrupula* live and thrive for years, and *Sabella* for many months, also the tube-worm *Cistenides*. The sea-squirt lives well and multiplies, and one or two species of *Botryllus*. Close scrutinizing of the aquarium will often reveal colonies of hydroids, which appear suddenly and may live for several months. Sea anemones are fed with the soft portions of a clam or oyster. The coral will require it chopped quite fine. Take a little at a time on the end of a slender rod, tapered to a point, and place it carefully in contact with the tentacles, near the centre of the disk, where the mouth is situated. Crabs and shrimps will take it from the bottom. It is

well to accustom them to come to a particular location each time. All dead matter must be removed with promptness. If the water should become cloudy it indicates the presence of decomposed animal matter. It may

mens at first, and carefully watch the condition of the water and animals. Practical experience is the best teacher, and success will reward persistent effort. The student of biology will find a varied and fertile field in the life which can be maintained in aquaria."

Gosse's formula for making artificial sea-water:

Common table salt.....	81 parts
Epsom salts	7 "
Chloride of magnesium.....	10 "
Chloride of potassium.....	2 "

Total 100 "

One pound of this mixture, carefully dissolved in water and filtered, will make about three gallons of sea-water.

THE INCREASING CONSUMPTION OF CARP.

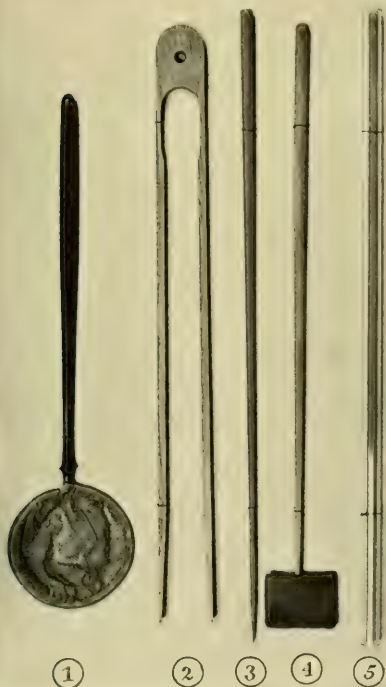
It is frequently very interesting to overhear the remarks of visitors at the Aquarium. One of the tanks has always been devoted to the exhibition of the different varieties of carp, and men stopping before this collection often remark, "Why was this dreadfully common fish ever introduced into American waters?"

It was originally brought to the United States, not by the Government, as is generally supposed, but by private citizens. While few would at present defend the introduction of the European sparrow, the carp is not altogether useless. We have a steadily increasing population to feed in America, and the question of food for the people will become more important as the years go by. The latest statistics of the Fish Commission show that the carp is figuring extensively in the fish-food supply. More than 7,000,000 pounds of carp are marketed yearly in New York City, nearly all this amount being purchased by foreigners living on the East Side. More than 17,000,000 pounds are used annually in the United States, and the carp catch from the Illinois River alone is nearly 6,000,000 pounds.

Our waters are already overtaxed to furnish the annual supply of native fishes, and it may be that in the end the cheap fish-food represented by the carp will be very satisfactory to an important proportion of our population. In any event the so-called "carp nuisance" promises some abatement, if the fishery statistics of the past two or three years are worthy of consideration. As the species cannot now be exterminated the best way to deal with it is to catch and eat it.

GIFTS TO THE AQUARIUM.

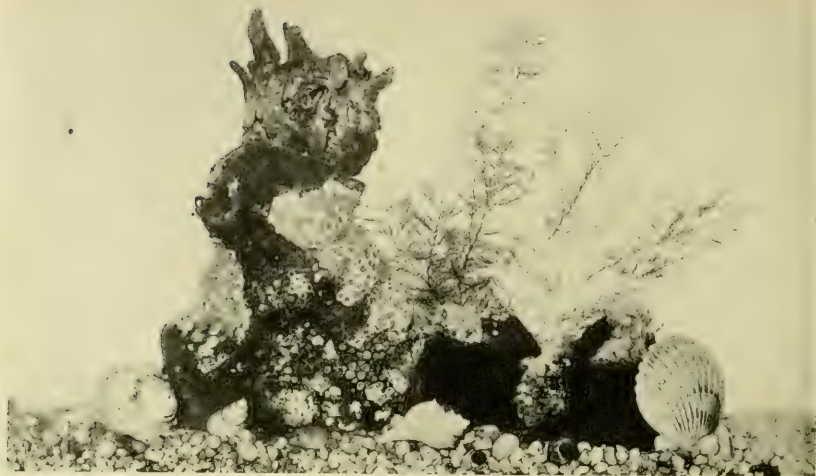
During the months of January and February the following-named fishes were received at the Aquarium: brook trout, rainbow trout, hybrid trout, brown trout, landlocked salmon (young), Atlantic salmon (adult and young), golden tench, green tench, pickerel, pike, rock bass, sucker, crappie, wall-eyed pike, yellow perch, sunfish, goldfish, paradise fish, skate, cunner, mutton-fish, tautog, sculpin, and tom-cod—350 specimens in all. Most of these were gifts from the U. S. Fish Commission, the New York and New Jersey Fish Commissions, the South Side Sportsmen's Club, and Mr. Henry Bishop of Baltimore.



AQUARIUM IMPLEMENTS.

1.—Net 2.—Forceps. 3.—Stick for feeding. 4.—Swab for cleaning glass. 5.—Tube for taking up refuse.

be necessary at times to siphon out the water and clean the gravel, or all the animal life might be killed. The water can be often corrected by dipper aeration, as before stated. Use fresh water to supply the loss by evaporation. Anemones are apt to move out of sight to the back of the aquarium, so it is best to keep them in view and thereby avoid possible trouble. It is very difficult to give any rule as to the number of animals to stock an aquarium which will be practical. Use plenty of *Ulex*, and see that it is in good condition. The beginner is apt to use too much animal life. He should try very few speci-



NATIVE CORAL.

SOME MARINE INVERTEBRATES OF THE NEW YORK REGION

BY ALFRED GOLDSBOROUGH MAYER,

CURATOR IN THE MUSEUM OF THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES.

ALTHOUGH many of the most interesting and beautiful of marine creatures are invertebrates, the Aquarium has up to the present been obliged to confine its exhibits almost exclusively to the fishes. This is due to the fact that the water with which the Aquarium is supplied is less than one-half as salt as sea water, and while many fishes will thrive in brackish water, only a few of the marine invertebrates can survive in it.

As soon as possible the salt water supply of the Aquarium will be improved by the storage of pure sea water, and then it will become possible to display some of the most interesting and remarkable creatures of the ocean for the pleasure and instruction of thousands of people.

The most beautiful of such creatures live in tropical seas, and will be obtained chiefly from the Bermudas; but meanwhile a little

account of a few of the invertebrates which haunt our own coast, and with which all lovers of the ocean beach are familiar, may not be amiss, especially as the collector of the Aquarium will be able to get most of them in abundance.

We all know that some of our birds are winter visitors, others are with us in summer, and that still others remain throughout the year, yet few of us realize that the same may be said of our marine animals.

However, during the summer the southerly winds cause a whole host of southern creatures to be drifted upon our coast, so that in August we find all along the southern coast of Long Island a large number of animals who are wanderers from the warm waters of the Gulf Stream, or whose home is off the coral-girt shores of Florida.

Such is the white ghost crab (*Ocypoda arenaria*) which lives upon the Florida

beaches and digs long straight burrows into the sandy shores. At night in Florida the whole beach seems alive with the white flickering creatures darting to and fro with almost incredible rapidity. Occasionally one rushes into the water, and then often a lively splash announces that the ever-watchful gray snapper has obtained his sought-for meal. Late in August one may find little ghost crabs, about one-eighth of an inch wide, living upon the glaring sands of Fire Island. But by far the greater number of our southern visitors are those whose whole lives are spent floating within the ocean. Such is the multi-hued Portuguese man-o'-war (*Physalia arethusa*), a creature of the tropical Atlantic. Beautiful iridescent colors play over the large pear-shaped air-sack which serves to float the animal, or rather colony, for the creature consists of a large number of spindle-shaped polyps, whose mouths are ever ready to seize upon the unlucky fish who may have ventured too near the long purple-beaded tentacles with their myriad stings.

Other creatures allied to the Portuguese man-o'-war, but smaller, are the *Pelella*, whose crest is stiff and papery in appearance, and the *Porpita*, which appears as a beautiful deep cobalt-blue disk with a greenish centre. On the lower side of the disk is the large central mouth, surrounded by rows of deep blue tentacles armed with stings.

Not all of our southern visitors are found floating, however, for in Great Peconic Bay we find early in September a milky-white jellyfish, which gropes about upon the bottom and gives one quite a severe sting. This is *Tamoya haplonema*, whose home is upon the Brazilian coast, and along with this curious jellyfish are a large number of other creatures whose proper home is in the West Indies.

Such is the case with the serpent star (*Ophiocodna olivaceum*), a rich olive pentagonal disk with five long writhing arms, which readily break off when seized.

As the autumn passes into winter the southern wanderers die away in the unwelcome cold, and only the smallest remnant survives the winter; but as the northerly and easterly winds begin to blow, the cold Arctic water, which has been backed up to the northward of Cape Cod throughout the summer, begins to creep down along the New York and New Jersey coasts, and to bring with it a new host from the Arctic Ocean.

Most of these creatures are too minute to attract general attention, although their presence in vast numbers often causes the

ocean to glow with brilliant phosphorescence when disturbed.

The pale, milky, disk-shaped jellyfish (*Aurelia*), with its four pinkish horseshoe-shaped ovaries, is one of these arctic creatures, as is also the yellow and brown jellyfish (*Cyanea*), found off our coast in the spring and early summer. In spring these arctic creatures begin to develop rapidly under the warming rays of the ascending sun, but by the middle of June the water has become too warm for them, and they perish, as did the southern visitors in the autumn.

But it is with our permanent residents that we are most familiar. Everyone knows the starfishes (*Asterias forbesii*) which abound along our shores and which crawl slowly over the bottom, pulling themselves along by means of hundreds of little tubular feet provided with terminal suckers. Woe to the unlucky oyster or mussel which lies in their way. The five flexible arms slowly wrap around the bivalve, and hundreds of the sucking feet begin to pull steadily but surely until even the strong muscle of the shells must yield. Then the starfish everts its stomach and engulfs the mollusk.

Long Island Sound is famous for its oysters, which thrive best in shallow bays and estuaries where the water is apt to be brackish. The oysters feed upon minute floating plants called *diatoms*, and also upon small marine animals.

During the summer their eggs are cast out in myriads into the water, each full-grown female producing about 9,000,000. These rapidly develop into little helmet-shaped creatures, which swim rapidly through the water until the shells begin to appear, and they settle down upon their left sides, there to remain throughout life.

The pectens or scallops are also most abundant in Long Island Sound, especially where the bottom is covered with eel-grass. They swim rapidly by opening and closing the shells, and along the edges there are dozens of little eyes, which enable the animals to be very wary of capture.

Before leaving the mollusks we must pay a moment's notice to the whelks, great pear-shaped snails, which plough along the sands and crush to death other mollusks. Their eggs are laid in long strings of disk-shaped cocoons, resembling checkers strung together. Another sand lover is the *Lunatia hexas*, with a smooth round shell. The "sand-collars" found in shallow water in summer are the egg clusters of this snail.

One of the most interesting of our animals is the little star coral (*Asrangia danae*),

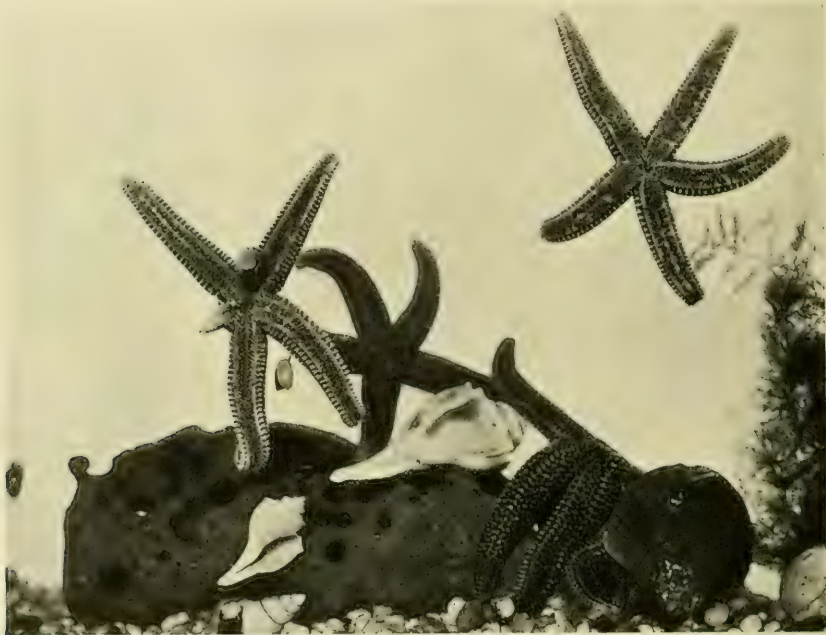
which is the most northerly coral known. In life each little cup-shaped star is surmounted and surrounded by a delicate milky-white sea anemone with a slit-like mouth and a crown of waving tentacles, armed with myriads of stinging threads. The accompanying photograph shows a very beautiful coral from the Bermudas (*Isophyllia*), which has been living in a jar of pure sea water at the Aquarium for nearly a year.

In this brief notice of a few of our most common marine creatures, we must not omit

distinguished its ancestors. In May and June the female horseshoe crab crawls up along the shallow water-covered beaches and digs a hole in the sand, wherein she lays her eggs.

The lady crab (*Platyonichus ocellatus*) is certainly the most beautiful of our crustacea, being of a delicate yellow, speckled with bright red spots. It haunts sandy beaches and buries itself up to the eyes at the least alarm.

Our common blue crab or edible crab



STAR FISH—EXPANDED.

to speak of the crabs, great numbers of which live in the shallow bays along the southern shore of Long Island or in the Sound.

One of the most interesting of these is the horseshoe crab (*Limulus polyphemus*), which is not, truly speaking, a crab, but is one of the few survivors descended from the once numerous race of the trilobites.

When very young the horseshoe crab resembles a trilobite, but in later life it changes and loses many of the characteristics which

(*Callinectes hastatus*) is exceeding abundant along the Long Island shores. Very near relatives of this crab are widely distributed, being found in both Atlantic and Pacific oceans.

Probably the most characteristic crab of the Long Island Sound is the spider crab (*Libinia dubia*), which lives upon rocky and muddy bottoms, and whose "arms" spread fully 18 inches. This crab is, however, a mere pigmy when compared with his cousin from the deep sea off the coast of Japan,

which spreads over 12 feet. These spider crabs have interesting habits. They tear off pieces of sea-weed, hydroids, etc., and fasten them upon their backs, where the weeds soon anchor and grow, concealing the crab under a veritable marine garden.

Several species of hermit crabs abound along our coasts. The head parts and the legs of these crabs are protected by a tough horny covering, but the abdomen is soft and is never exposed to the attacks of enemies, for when very young the crab seeks out some

very young the barnacle swims rapidly through the water, having six pairs of legs and well-developed eyes. Very soon, however, it fastens itself to the side of some rock or wharf by means of the sucker-like antennæ. The shell then grows, and it remains throughout life lying upon its back, and, as Huxley aptly put it, "kicking its food into its mouth."

Specimens of the American lobster (*Homarus americanus*) may often be seen at the Aquarium. Our lobster fisheries are still of



WHITE SEA ANEMONE.

deserted shell, into which it thrusts its soft flexible abdomen, and which then serves as its house, which it carries about on all occasions.

As the crab grows it occupies larger and larger shells, until even our largest mollusk-shells are none too large for it. These crabs will, however, occupy old bottles and clay pipes as well as shells. When very young they swim through the water, and are then totally unlike the "hermit" in appearance, for a long saw-toothed spine several times longer than the body of the little creature projects forward from its head. Few of us think of the barnacles as being relatives of the shrimps, yet such is the case, for when

great value, although the persecution to which this valuable food animal is subjected is causing it to decrease rapidly, both in size and numbers, so that unless legislation interferes the lobster will become almost extinct. In former years large lobsters were abundant, and individuals have been found measuring 42-inches in length and weighing 42 pounds. Such monsters are now almost unheard of. It is believed that the work of artificial propagation of the lobster, now being carried on by the Government, will result in saving the species, and the eggs of the lobster will be among those exhibited at the Aquarium fish-hatchery during the coming summer.



SPECIMENS OF THE AXOLOTL, NEW YORK AQUARIUM.

THE AXOLOTL.

A photograph published in this number of the BULLETIN shows four specimens of the axolotl (*Amblystoma mexicanum*) Cope, which have lived at the Aquarium for several years, growing considerably during that time. This interesting amphibian is a species in which it was long said the larval stage was never passed, and it appears from experiments that, if kept in the water continuously, it may retain its gills indefinitely. It has been bred from eggs for many years in European aquariums, and, like other larval salamanders, may reproduce limbs that have been cut off.

It abounds in the lakes about the City of Mexico, and is used for food, reaching a length of ten inches. Species of the same genus, especially those found in the United States, pass through a metamorphosis in which the external gills are absorbed, and the animal can live on land.

Other interesting amphibians in the Aquarium collection are the hellbender, of the Ohio valley; the mud puppy, of the Great Lakes; and the amphiuma, of the Southern States. Specimens are promised of a new and interesting blind genus (*Typhlomolge*), which comes at times from the artesian well of the United States Fish Commission station at San Marcos, Texas.

PUBLICATIONS.

FIRST ANNUAL REPORT	Paper, 40 cents
SECOND " "	Paper, 75 cents. Cloth, \$1.00
THIRD " "	40 " " 0.60
FOURTH " "	40 " " 0.60
FIFTH " "	75 " " 1.00
SIXTH " "	75 " " 1.00
SEVENTH " "	75 " " 1.00

NOTES ON THE MOUNTAIN SHEEP OF NORTH

AMERICA. (Hornaday). Paper, 40 cents

DESTRUCTION OF OUR BIRDS AND MAMMALS

(Hornaday). 75 cents

THE CARIBOU. (Grant). Paper, 40 "

BULLETIN No. 1. 50 "

BULLETIN Nos. 2, 3, and 4. 10 "

BULLETIN No. 5. 15 "

BULLETIN No. 6. 15 "

BULLETIN No. 7. 15 "

BULLETIN No. 8. 15 "

BULLETIN No. 9. 15 "

GENERAL INFORMATION.

ADMISSION TO THE PARK.—On all holidays and on Sunday, Tuesday, Wednesday, Friday, and Saturday, admission to the Zoological Park is free.

On every Monday and Thursday, save when either of those days falls on a holiday, only members of the Society, and persons holding tickets from the Society, are admitted free. All others pay twenty-five cents for each adult, and fifteen cents for each child under twelve years of age. Tickets are sold only at the entrances.

Admission to the Aquarium is confined to members on Monday and Thursday from 10 A.M. to 12 M. At all other times it is open to the public.

OPENING AND CLOSING.—From May 1st to November 1st, the entrance-gates will be opened at 9 A.M. and closed half an hour before sunset. From November 1st to May 1st the gates will open at 10 A.M.

BICYCLES must be checked at the entrances (five cents). All wheels not called for half an hour before sunset will be locked up until the following day.

RESTAURANT.—At the Rocking Stone Restaurant meals are served à la carte every day from 10 A.M. to the closing hour. The North Pavilion of this building has a spacious lunch counter, where all kinds of luncheon food are served at popular prices.

The South Pavilion will be arranged as an open-air dining-room. The service will be increased and improved, so that large numbers may be served expeditiously.

ZOOLOGICAL SOCIETY BULLETIN

NO. 10

PUBLISHED BY THE NEW YORK ZOOLOGICAL SOCIETY

JULY, 1903

TRAINING ORANGS AND CHIMPANZEES

BY RAYMOND L. DITMARS,

CURATOR OF REPTILES

TWO ideas were in mind when the training of orang-utans and chimpanzees began in the Park. One was to furnish an exhibition which would amuse the crowds of children, and the other to furnish interesting psychological demonstrations of the intelligence of these apes and the facility with which they adapt themselves to manners "aping" mankind. The orang dinner parties,

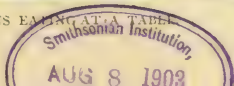
the antics of Rajah on his velocipede, and the solemn dignity of Polly, the chimpanzee, when dining in public, all are features familiar to thousands who have visited the Park in midsummer. The education of these animals embraced an extremely interesting series of events.

Usually, the training of wild animals is associated with the long crack-whip, or possi-



PHOTO BY E. R. SANBORN.

ORANG-UTANS EATING AT A TABLE



bly with one that does not make so much noise, but is still more emphatic in its demands. With the whips go harness and tackles, months of stress and struggle, and finally achievement, but very frequently suc-

of real affection. Although displaying the greatest friendliness toward their keepers and those frequently about them, young oranges make friends readily, and upon a distinct intimation from a stranger that he or she seeks their friendship, there is often the same affectionate nestling against the breast that is ever ready for the keeper in charge. Little oranges are genuine children, and if denied their wishes, will roll about, screaming vociferously, and beating the floor with clinched hands. The granting of their wishes is followed by immediate quiet, and a look of solemn satisfaction.

As the orang grows older, it becomes wilful, morose, and even dangerous. Full-grown specimens are very rare in captivity. Even a half-grown specimen will often resent intrusion into its cage by a volley of guttural roars which in a way resemble the efforts of a deep-chested man enthusiastically shouting "Hurrah." Such specimens are possessed with remarkable strength. With their open hands they strike fiercely at an intruder, and are not at all adverse to grasping an arm or limb, and employing their formidable teeth as a point of argument.



PHOTO BY E. R. SANBORN.

YOUNG ORANG-UTAN AND CHIMPANZEE.

cess is attained only by such vigorous measures that an animal cowers and falters through his act with but one desire—to finish and get beyond molestation. Many animals are literally driven through their work. Some, however, take naturally to training, understand readily, execute manoeuvres from a few simple words, and really enjoy their work. Such animals are usually trained through kindness, perseverance, and infinite patience. Perseverance is the watchword, but without patience among animal men, trained animals would never be seen.

The orang, when young, is one of the most tractable of animals. The chimpanzee is rather stubborn, but of the two, the more intelligent. The average orang-utan, from one to three years old, is unlike a "wild" animal. Its disposition and actions are like those of a human child. It delights in being carried about by the keeper, throwing its long, hairy arms around his neck in a spirit

Although more stubborn than the orang, the chimpanzee displays keener perceptions, and learns quickly. When approaching maturity, however, the males are almost invariably dangerous. Although fond of being carried about in the arms of the keeper, they are disposed to resent the presence of strangers. The keeper seldom passes the cage of a chimpanzee, even though he makes his way through a dense crowd, without being greeted by a series of sharp grunts of friendly recognition. The chimpanzee's disposition is pert and wide-awake, and the young animal learns rapidly if it pleases him to do so. If he objects, there is more noise from his small throat, and more kicking and subsequent sulking than would be displayed by three oranges. The more passive young orang, generally ludicrously anxious to imitate, and seldom showing signs of displeasure unless some heartfelt wish is denied, wins the greater affection of the animal man by its ex-

treme good nature, and naturally mild and passive disposition.

The achievements of "Rajah," a three-year-old orang, who during summer delighted thousands in the Park, and ultimately succumbed to a strange disease brought in by the giant tortoises, demonstrated the high degree of orang intelligence. Rajah was taught to ride a child's velocipede. He steered the vehicle unaided, and greatly enjoyed the exercise, as he would ride in great circles around the Reptile House for half an hour at a time before attempting to dismount.

His riding lessons comprehended only the short period of about three weeks. At the beginning he was seated upon the vehicle, and by the shaking of the keeper's finger, ordered to stay there. This he understood. After learning to sit properly, holding the handles in regulation style, his feet were tied to the pedals, and he was guided around by hand. From this time on, the endeavor was made to introduce into his mind the idea that the pedals propelled the machine, and that his feet controlled the pedals.

By the exercise of considerable patience in grasping his feet and the pedals at the same time, and attracting his attention to the operation, he soon learned to drive the vehicle himself. The steering was acquired involuntarily, and he soon learned the art of guiding the machine so skillfully that he could ride up to objects that particularly interested him, and go around them, while satisfying his curiosity. It is of pleasant interest to relate that during the time occupied in teaching this animal to ride the velocipede, not a blow was struck, and harsh words seldom found necessary. Patience, and an endeavor to demonstrate what was wanted of him, elicited from Rajah the most hearty co-operation his simian brain was capable of displaying.

Rajah's greatest achievement was his afternoon meal, on a high platform, in front of the Reptile House. Few performances among wild animals demonstrated greater intelligence on an animal's part than did this. That Rajah as fully understood what was ex-

pected of him was indisputable. He received no orders or commands during the entire performance, and he displayed a perfect understanding of the various things to be done.

The platform was reached by an eight-foot



PHOTO BY E. R. SANBORN

YOUNG CHIMPANZEE, POLLY.

ladder. After being dressed in a diminutive uniform, Rajah was given the word, and placed on the ground near the bottom of the ladder. Climbing quickly to the top, he reached for his small chair, and seated himself at the table. This was always an operation of some deliberation, and culminated in either settling the chair more squarely to the table, or pulling the table toward the chair. Immediately grasping a spoon, Rajah began his meal by consuming his bowl of rice. Upon completion of the first course, with grave deliberation he pushed the bowl toward the centre of the table, laid down the spoon, and began the second course. This consisted of sliced bananas, which he carefully speared with a fork.

The completion of this course was followed by milk, which was served in a small teapot. Rajah poured the milk into a small cup, when, setting down the teapot, he would turn his attention to the cup. This last act in the dining performance was always ap-

proached with some apprehension on the part of his trainers, one of whom stood nearby on the platform, ready with a word of warning, command, or encouragement, which was, however, seldom found necessary.

Eager to do exactly what was expected, Rajah was also apprehensive of this part of the proceeding, as he had been made to understand that the spilling of any fluid from the teapot or cup was highly inappropriate. It was during the pouring operation, when the cup was nearly full, that Rajah often turned toward the keeper to observe whether he appreciated the nicety of the operation.

Alas! for this solicitation of approval; for catastrophe usually followed. Upon directing his attention back to the cup, Rajah sometimes found it overcharged, and the milk being spilled upon the table. His endeavor to quickly right these conditions, and set down his miniature teapot, was always so ludicrous as to be followed by a shout from the crowd, which to Rajah seemed most uncalled for, and elicited from him a solemnly reproachful survey of his audience, terminating in an appealing gaze at his keeper.

It may surprise the reader to learn that to teach Rajah to execute these various manoeuvres did not consume many weeks, and that as time went by, his associates, Brunei, Sultan, and Sally, were all instructed in table manners. The four dining together in solemn state constituted one of the most amusing and remarkable of simian exhibitions. Unfortunately, all of those exceptionally intelligent apes succumbed to the strange intestinal infection contracted from the big tortoises, which, although involving a great loss to the Park and the public, contributed a valuable addition to the records of pathological science.

At present, the stars of the Primate collection are two oranges and two chimpanzees, Dohong, Soko, Polly, and Peggy. Excluding Soko, the large chimpanzee, they dine together at a small table, seated in high chairs, and furnish an interesting and amusing exhibition. None of these apes, however, exhibit the intelligence of Rajah. Dohong is the brightest, and Soko the most unmanageable of the four.

The exhibitions take place daily at three o'clock, in the large outside cage at the north end of the Primates' House. It is then that Dohong and Peggy, the oranges, and Polly, the

chimpanzee, are dressed and seated at their table. The latter two are still novices in the art of eating man-fashion, and illustrate how these animals are taught to properly spear sliced bananas and the like. By guiding the hand, the fork is inserted in a slice of the fruit, when the remainder of the operation, namely that of conveying the food to the mouth, is enthusiastically accomplished without assistance. The little creatures have thus far acquired the idea that they must employ the fork in eating, and are struggling to obtain a mastery over the delicacy required in its proper employment. Dohong, however, is more advanced, and eats with a fork unaided, although his efforts are oftentimes conducive to much mirth on the part of his audience. He is receiving daily lessons, his hands being guided in the proper movements, and altogether he promises to be a very bright animal. He was recently initiated into the art of pouring tea into a cup, his hands being guided in the proper movements by his keeper.

Generally speaking, the training of the orang-utan and the chimpanzee closely approaches the management of an untaught child. These creatures do not seem as much like lower animals as do the majority of the so-called "dumb brutes." Coaxing and perseverance have been responsible for these afternoon exhibitions.

As time goes by, the mental faculties of these apes will develop, chiefly through the stimulus of training, and association with their keepers. If they are spared by tuberculosis, the deadly foe of every captive ape and monkey, the development of their mental powers will be watched with continuous interest.

GENERAL INFORMATION.

ADMISSION TO THE PARK.—On all holidays and on Sunday, Tuesday, Wednesday, Friday, and Saturday admission to the Zoological Park is free.

On every Monday and Thursday, save when either of those days falls on a holiday, only the members of the Society, and persons holding tickets from the Society, are admitted free. All others pay twenty-five cents for each adult, and fifteen cents for each child under twelve years of age. Tickets are sold only at the entrances.

Admission to the Aquarium is confined to members on Monday and Thursday from 10 A.M. to 12 M. At all other times it is open to the public.

OPENING AND CLOSING.—From May 1st to November 1st the entrance-gates will be opened at 9 A.M. and closed half an hour before sunset. From November 1st to May 1st, the gates will open at 10 A.M.

BICYCLES must be checked at the entrances (five cents). All wheels not called for half an hour before sunset will be locked up until the following day.

RESTAURANT.—At the Rocking Stone Restaurant meals are served à la carte every day from 10 A.M. to the closing hour. The North Pavilion of this building has a spacious lunch counter, where all kinds of luncheon food are served at popular prices.

The South Pavilion will be arranged as an open air dining-room. The service will be increased and improved, so that large numbers may be served expeditiously.

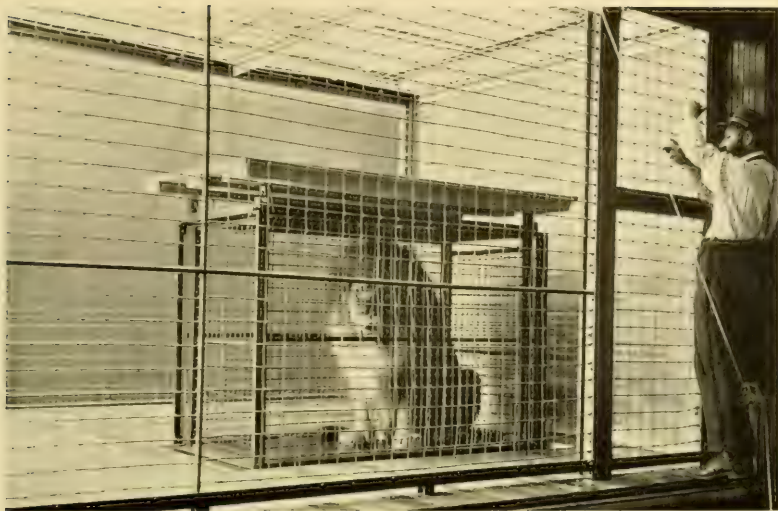


PHOTO BY E. R. SANDORF.

STUDIO IN THE LION HOUSE.

Showing cage into which specimens are placed for study.

THE STUDIO IN THE LION HOUSE

THE recently-opened studio in the Lion House may fairly be regarded as a practical demonstration of the Zoological Society's interest in animal painting and sculpture, and its desire to promote those branches of art.

Like so many other features of the Zoological Park, this is an experiment. That artists and sculptors need and deserve better facilities than previously have been available to them in working from living animal models, there can be no question. That good facilities for work, and sympathetic co-operation on the part of animal exhibitors will stimulate the production of masterpieces in wild-animal art is an assured fact. The duty of every zoological park and garden to its faithful ally, the artist, should be openly and cheerfully acknowledged.

The precise ways in which a zoological institution like ours can best serve the ends and aims of art is yet an open question. It is hoped that the Lion House Studio will prove to be an adequate and acceptable pro-

vision for the needs of artists and art students in connection with their work on the large carnivores, and also many other animal models that can be made available within it.

Because of the fact that the studio idea was so entirely new and untried, and also because of the demands for the immediate completion of the exhibition hall, several months have elapsed between the opening of the Lion House and the opening of the studio. Every step in and about the latter has been an experiment. No sooner was one problem solved than another arose to take its place. Finally, however, on July 9th, the studio was sufficiently complete that the animal painters and sculptors of New York were invited to view it, open and ready for use, with a living lion of the first rank as the first model.

In 1897, in a very practical communication addressed to the Zoological Society, and published in its Annual Report, Mr. Ernest Thompson Seton advocated the creation of a school of animal painting and sculpture on a liberal scale, established in the Zoological

Park in a large studio. The studio room now in use in the Lion House will serve well in demonstrating the practicability of Mr. Seton's idea, and the need for so large and serious an establishment as he proposed. If this offering to art proves of real value and importance, *if it proves to have been a wise investment of the money and thought it has cost*, there is no saying what influence it will exert on the future. Time alone—and the annual output of work—will reveal whether or not it is the right thing in the right place.

The Studio is situated at the northeastern corner of the Lion House, with northern light. The model-stand is a wire-fronted cage 19 feet long, 9 feet deep, and 7 feet high, with its floor raised 2½ feet above that of the room in front. The entire back of the cage, the north end, and the top are composed of solid plate-glass, backed by steel netting as a factor of safety. The roof glass is opaque, the remainder clear. For ventilation, the two plates of the north end swing open, like doors.

The working space in front of the model's cage is a room 16½ x 20 feet, without platforms of any kind. Across the hall from this room is another of similar size, which is for the use of workers in the studio itself, and which, as soon as possible, will be provided liberally with individual lockers.

To control the light, dark olive-green shades, on rollers, easily controlled from the front, have been provided for both the back of the cage and the north end. The cage-front is of steel-wire netting, of large mesh, similar to that in use for the cages in the exhibition hall. As the result of much experimenting, the painting of this netting renders it as inconspicuous and as free from high light on the horizontal wires as it has been possible to make it.

At the proper point, three artists and two sculptors were invited to visit the unfinished studio, as an advisory committee on its equipment, and the adoption of regulations regarding its use. Those who were able to respond on the day appointed were Messrs. Daniel C. Beard, Eli Harvey, and Carl Runge. Mr. Seton and Mr. Proctor were unable to attend. Everything done since that

occasion has been in strict accordance with the practical advice then received by the Director. The regulations that have been adopted regarding the use of the studio are precisely as proposed by the gentlemen named above, who, it is but fair to say, gave the matter long and careful consideration. From the first, the Society has taken the ground that it is for the artists and sculptors themselves to say how the use of the studio shall be regulated.

At present it is impossible to offer a schedule naming the animals that will be placed in the studio on certain days. By means of the shifting system in the Lion House any animal can, under proper conditions, be taken from its cage by the shifting car, and transferred to the studio cage. Of course every such transfer and return involves some labor, very correct management, and the anxiety inseparable from the handling of savage and dangerous animals. These factors create a new series of difficulties to be overcome in rendering the Lion House Studio of the greatest use to the greatest number; but when the wants of the studio have been fully revealed they will certainly be met. W. T. H.

CRAWSHAY'S ZEBRA

ON May 20 the Zoological Society received by purchase from Mr. Hagenbeck two fine specimens of a very rare and odd-looking species of zebra, known as Crawshay's Zebra (*Equus burchelli crawshayi*). These animals were imported last year from the Kilimandjaro district of German East Africa, and are now four years old.

This species is one of the largest and handsomest of the wild members of its genus, and so closely resembles the rare Mountain Zebra, of South Africa, that only those specially interested can note the difference between them. Both are marked on the body and hind-quarters by very wide stripes of black and white, without shadow stripes, but these specimens lack the cross-bars, or "gridiron," on the top of the hind-quarters which mark the Mountain Zebra (*Equus zebra*). Crawshay's Zebra is strongly striped quite down to the hoofs, has a heavy dorsal stripe, and also a longitudinal stripe under the body, which is touched by the stripes of the sides. The tail is marked throughout its basal half by broken bars of black, and the tuft is all black.



PHOTO BY E. R. SANBORN

CRAWSHAY'S ZEBRA.

So far as experiments have been made, all species of zebras appear to be quite capable of domestication, and training to work in harness. While some individuals are of vicious temper, and difficult to train, this is equally true of range-bred horses, and there is no evidence to prove that zebras can not be bred, trained and driven quite as successfully as horses of the best class. In the Transvaal, the Messrs. Zeedesberg once employed eight zebras to draw one of their coaches between Pretoria and Fort Tuli, in Rhodesia. The animals were caught wild, easily broken to harness, and pulled willingly and well.

At the Agricultural Show held in Pretoria in

April, 1892, Captain M. H. Hayes broke in a Burchell Zebra, in half an hour's time, so that it could be ridden without an accident; and this was accomplished without throwing, hobbling, or tying the animal head to tail.

In view of the immunity of the zebra from the death-dealing powers of the tsetse fly, and the absolute certainty of its value as a draught animal, it seems very strange that the colonists of South Africa have not long ago brought this fine animal into general use, at least in the pest-ridden fly-districts.

The species of zebras and wild asses of Africa, as now recognized, are as shown below: W. T. H.

ZEBRAS AND WILD ASSES OF AFRICA.	WILD ASS.	AFRICAN WILD ASS (One stripe only). <i>E. asinus</i> ,	N. E. AFRICA.
		SOMALI WILD ASS (Stripes on legs). <i>E. asinus somalicus</i> ,	SOMALILAND.
	QUAGGA.	(Half zebra striped), <i>E. quagga</i> ,	Extinct.
	BURCHELL ZEBRAS.	BURCHELL'S ZEBRA Type (Least striped of zebras), <i>E. burchelli</i> , "Probably now extinct."	
		DAMARALAND ZEBRA, <i>E. burchelli antiquorum</i> ,	S. W. AFRICA.
		CHAPMAN'S ZEBRA, <i>E. burchelli chapmani</i> ,	CENTRAL S. AFRICA.
		SELOUS' ZEBRA, <i>E. burchelli selousi</i> ,	MASHONALAND.
		CRAWSHAY'S ZEBRA (Heavily striped), <i>E. burchelli crawshayi</i> ,	NYASSALAND, AND GERMAN E. AFRICA.
	MOUNTAIN ZEBRA.	(Heavily striped). <i>E. zebra</i> ,	S. AFRICA.
	GREVY'S ZEBRA.	(Most striped of zebras), <i>E. grevyi</i> ,	E. AFRICA.

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THE ADMINISTRATION BUILDING

Hitherto the energies of the New York Zoological Society have been directed toward the establishment and equipment of the Zoological Park; but the time has now arrived for the consideration of the interests of its own members.

Thus far the members of the Society have devoted large sums of money, in the neighborhood of three hundred thousand dollars, to Zoological Park buildings and collections, and the demand for animals will be continuous. A collection of living animals is, in the nature of things, but transient, and the supply must be kept up. At the same time, the members of the Society who so generously bear the burdens, are entitled to more consideration than they have thus far received. It is in order to do justice to the

members themselves that the Executive Committee is anxious for the proposed Administrative Building.

At present the privileges of membership consist chiefly in free admission on pay days to the Zoological Park, and on closed forenoons at the Aquarium, and the receipt of the various publications and reports. Naturally, the publications will, as time goes by, increase in value and general desirability, but the Executive Committee desires to take at once a step of commanding importance to every member of the Society.

The object in view is the erection of a handsome and spacious structure, to be known as the Administration Building, and to be used as the scientific, literary, and artistic headquarters of the Society in the Zoological Park. At present, aside from the small office of the Director, in the very combustible Service Building, the Society has absolutely no abiding place in the Park. There is no proper meeting-place for the officers, nor for members; no fire-proof quarters for the first-class zoological library which the Society must have, nor for the animal paintings and sculptures which it intends to collect. It is the purpose of the Society to acquire in the course of time a series of heads and antlers of the important game animals, and these will be placed on exhibition in this building.

Private parlors will be provided for the families of members, and the meeting-room for the members themselves will be furnished with the various magazines and papers treating of subjects allied to the work of the Society.

This proposed building will cost between \$50,000 and \$60,000, and will be located to the northwest of the old workshops, which must be removed to make room for it.

It is to be hoped that the members will appreciate these privileges and will aid the

Executive Committee by securing additional members. No less than three thousand members are needed, and while our present numbers compare favorably with similar societies in this city, they are greatly below those of European cities.

The subscription of ten dollars a year is not a serious matter to many residents of this City, and each of the present members could easily obtain for us one or two new members. With a membership of three thousand, and an income of thirty thousand dollars derived from it, the Society would be in a position not only to furnish animals, which are now provided by private munificence, but to extend its work in protecting the rapidly vanishing fauna of America, both mammal and bird. Scientific publications could be issued and the usefulness of the Society enlarged in every direction. The Society is just entering on this phase of its work and with the approaching completion of the Park it will be at liberty to develop new lines of usefulness.

It is scarcely necessary to add that while every member of the Society can greatly assist its work by providing at least one new member, many of the members are in a position to make additional subscriptions to special purposes, such as its Administration Building. One of the members of the Board of Managers has already subscribed five thousand dollars, and the Executive Committee will be glad to receive further subscriptions of a like or less amount. For two years, no call for subscriptions for buildings has been made, but the Administration Building is a structure which must be provided at once.

M. G.

THE ANTELOPE HOUSE

The completion of the Antelope House draws near; and the outlook at this date as-

sure a building which, with its collection, will constitute one of the finest features in the Park. In the next issue of the Bulletin it will be fully described and illustrated. It is no exaggeration to say that both the building and the grounds surrounding it are developing even more satisfactorily than was anticipated. The earth filling that has been done around the northern end of the building has added much to the impressiveness of the structure. It is like a city set upon a hill, that cannot be hid; and from every point of view the effect is pleasing.

The planning of the open-air yards and fences, to suit the animals, the building, and the grounds, has been a task which has taxed the ingenuity of the Director and the Engineer to the utmost. The difficulties to be surmounted were unusually numerous, and every point demanded careful study. Three kinds of metal fences and three kinds of gates were required, and each had to be specially designed. To confine elephants, elands, long-horned antelopes, zebras, and tropical bovines, and also to keep them from fighting through their fences, without making the fences as heavy and formidable as they sometimes are made for such creatures, was, to say the least, no easy task.

A contract for the fences and gates, of wrought iron and wire, was awarded on May 28th, to the Page Woven Wire Fence Company, for the sum of \$8,713.00, with a time-limit of ninety working days. We are assured that within three months from the signing of the papers, the yards will be ready to receive the animals.

For some months past the Society has been seeking far and wide for the species of hoofed and horned animals specially desired for the Antelope House collection. A few have already arrived. Others are in Europe awaiting shipment, and others are on the way from the interior of Africa. By the time the building and its yards have been completed, the collection will be ready.

The total cost of the initial series of animals for this collection will be about \$15,000.00. Elsewhere in this issue appears a notice of the Zebras, which, with other equines, will be exhibited in the Antelope House until a special installation for zebras and wild horses has been prepared. In the procuring of such rare species as the Eland, Sable Antelope, Roan Antelope and a few others, time is a factor that cannot be ignored, and the best we can do is to procure them as soon as the difficulties in each case will permit.



PHOTO BY E. R. SANDORF.

A GROUP OF DUCKS IN DUCKS' AVIARY.

THE KEEPING OF DUCKS FOR PLEASURE

BY C. WILLIAM BEEBE,

CURATOR OF BIRDS

THOUSANDS of people admire the delicate colors and clean-cut outlines of the ducks, in their Aviary and on the various ponds in the Zoological Park. Few, probably, stop to think how easy it would be to keep a pair, or a small flock, of such birds in a moderate-sized yard. The outlay of labor and money necessary for such an undertaking would be nominal, and the return in daily enjoyment would constitute a many-fold profit. Doubtless, many persons would take an interest in the keeping of ducks of various kinds purely for the pleasure of watching and rearing them, if they but knew how easy it is, how small a space is adequate, and how hardy are some of the species.

Let us assume a rather limited space and meagre water supply; for it is very easy to elaborate the directions dealing with such conditions, and adapt them to a larger scale.

Three questions, *sine qua non*, must first be answered. What accommodations do ducks

require? What care shall be given them? What species recommend themselves to the aviary of a private person?

A few bags of cement and sand will make a small pond which will give satisfaction to any variety of duck, the principal requirement being that it should have a maximum depth of at least eighteen inches. One end should slope gradually into the water, so that the ducks will have no trouble getting in and out. Any person so fortunate as to have a small stream flowing near, can easily make a satisfactory pond.

The space immediately around the pool should be pebbled, or covered with fine gravel. If kept in a small space, ducks will destroy the grass with the constant patter of their webbed feet, and it is necessary to substitute sand or gravel for bare earth, or else protect the grass with wire during the spring months. In an enclosure of liberal size, this of course is not necessary.

Some ducks require shelter during the winter, although many species, even if provided with houses, never use them. An excellent plan is to plant a thick clump of box



PHOTO BY E. R. SANBORN.

MANDARIN DUCK.

in some portion of the range. The foliage of this is too coarse for the ducks to destroy it, and so dense that it forms an admirable protection for nests and eggs. Being, in addition, an evergreen, it makes a fine shelter for the birds during severe winter storms. A little straw placed underneath such a clump of bushes will attract the ducks, which enjoy burrowing into it during cold nights. In winter all ducks and geese require that a small portion of their pond shall be kept free from ice, in order that the open water may keep their feet from freezing.

Wild ducks must be clipped or pinioned to keep them from flying away. Instead of frightening the birds by catching them every time they moult, and cutting away the flight feathers of one wing, it is much more humane to tightly ligature the wing with a piece of strong fish-line, just below the thumb, which is that portion giving rise to the tuft of feathers near the front bend of the wing, and with a pair of stout scissors cut off the bone immediately below the cord. There is no blood, the duck suffers little pain, the wound heals immediately, and the bird need never be troubled again. The feathers around the place to be ligatured should be tweaked out, and, if the cut be made straight and clean, not a feather will grow in dis-

torted, and the overlapping of the other wing will make the imperfection almost invisible. It is better always to operate on the wing of one chosen side, preferably the right.

When ducks are pinioned, a wire fence three feet high is sufficient to confine them, and enclosed thus they show to much greater advantage than if seen through wire netting.

It is a good plan to occasionally place some shovelfuls of pond mud or earth in the cement pool, as ducks love to sift it through their bills for insects and other food.

For the majority of ducks, grain is a staple diet, a mixture of wheat and cracked corn being as good food as any, although buckwheat and barley may be added to give variety. Ducks will enjoy having the grain sometimes thrown into the water, but they do not ordinarily require soaked food. Green food, however, they must have, either grass or lettuce, or even cabbage, the best being, of course, that *pièce de résistance* of a duck's menu—duck-weed. Even the grain-eating species like a little chopped fish or frogs now and then.

If not alarmed by dogs and other causes, ducks will become remarkably tame, and especially is this the case when they are cared for and fed by the same person.



PHOTO BY E. R. SANBORN.

GREEN-WINGED TEAL.

Neither ducks nor their first cousins, the geese, should be thought as in any way deserving the opprobrious lack of wit attributed to the latter class of birds. They are quick-

witted and will often take advantage in a remarkable way of fortunate changes in their environment.

A few words as to the kind of ducks to procure. The mallard, *Anas boschas*—the wild progenitor of the obese inhabitants of our barn-yards—is a first-rate variety to start with. The drake is a beautiful bird, with a glistening green head and neck, and a white neck-ring separating the color above from the rich chestnut of his breast. The female is an inconspicuous brown-colored bird. A wing-tipped pair, or young birds taken from some reed-hidden swamp, will make themselves at home under almost any conditions.

These wild birds differ in many ways from

balls to the water, the amateur duck fancier may congratulate himself on his first triumph. Let the little fellows have all the earth-worms and insects they can eat, and, until they begin to pick up grain, give them a dish of hard-boiled egg and lettuce chopped fine, mixed up with oatmeal and bread-crumbs. Aside from this they can take care of themselves.

Next, the black duck, *Anas obscura*, may be given a trial, and although not nearly so conspicuous a bird as the mallard, both sexes somewhat resembling the female of that species, yet they are not homely birds by any means, and are as hardy and easy to breed as the others.

Our country is rich in ducks, there being some forty good species, and no doubt all of these can be kept successfully. A glance at the fine flock of pintail ducks (*Dafila acuta*) in the aviaries of the Zoological Park will show the ornamental value of this beautifully colored and graceful species. The marbled breast of the gadwall drake (*Anas strepera*) is exquisite, and the delicate blue in the wing-mirror of the blue-winged teal (*Anas discors*) is a tint seldom found in nature. Another type to choose, if we wish, is the merganser (*Merganser serrator*), narrow of bill, the toothed edge of which hints that grain would not satisfy this bird, whose appetite must indeed be appeased with fish.

The sea-ducks are more difficult to procure, but there is no reason why eider-ducks and the other beautiful sea-going species should not thrive in confinement. Ruddy ducks (*Erismatura rubida*) are the most comical of their class, their infantile show of defiance when cornered being ludicrous. When swimming, their absurd tails seem at times to spread to all points of the compass. Get the ruddy duck, by all means.

The sprightly red-head (*Aythya americana*) is a duck worth keeping, and it soon becomes tame. The very sight of this bird or its cousin, the canvas-back (*Aythya valisineria*), quickens the pulse of a hunter or gourmand.

Those readers who have visited the Zoological Park are probably scanning these lines impatiently to find mention of the two most beautiful of all ducks, which I have reserved until the last—the mandarin duck of China (*Aix galericulata*), and the summer or wood duck (*Aix sponsa*), native of our own ponds and streams. The daring contrasts of



PHOTO BY E. R. SANDER.

MALLARD DUCKS.

their degenerate domesticated relations, and, no matter how cozy a house is arranged for them, the nest need not be looked for within its walls. One day in spring, when the sombre-colored duck is not to be seen, a careful search among the high grass or weeds which may have grown up in the enclosure, will reveal her brown back, almost hidden beneath a cover of carefully arched grass stems. Here she will be sitting on her six to twelve pale greenish eggs. All around the nest is a neat roll of down from her breast, and, when she leaves her treasures to snatch a hasty drink or a nibble of grain, she ingeniously unrolls this pearly gray coverlet and spreads it over all the eggs.

When she leads her brood of tiny puff-

color which these two species of ducks display never could be artistically combined on cloth or canvas, but in the plumage of these gorgeous birds each blends harmoniously with its associated tints.

The mandarin has all the striking color-medleys of oriental art, seeming to have just flown out of some Chinese screen, while the wood duck's colors are more distinct and individual. The females of both species are very much alike, and lack most of the brilliant tints of the drakes. The mandarin seldom breeds in confinement, but its companion species breeds freely. Place a box with a round hole cut in one side upon the top of a post, a foot or two above the water, and it will not be long before the female wood duck will build a nest of straw, and line it with the most beautiful down in the world—a mass of dark, cobweb fluff, studded with pearly stars. It is an exquisite setting for the buffy-white eggs.

How different in color and habits are the young wood ducks from the mallard ducklings! But these things are more interesting when they come as surprises. We will find that even ducks and geese can furnish scores of interesting facts—in their plumage, their language, and their habits. To select one at random, watch the gorgeous livery of the mallard drake after the breeding season is over, when his strong wing feathers begin to loosen in their sockets. They all fall out at once. If, when in his native haunts, his brilliant hues and helpless condition were contemporaneous, every hawk and fox would mark him as easy prey. But nature takes pity on him, and for a little while—only long enough to give his new wing-feathers time to sprout and strengthen—the protecting cloak of his brown mate falls upon him, and the two are hardly distinguishable. Then in a few weeks the bright tints return, he preens the last buffy feather from his iridescent plumage and triumphantly shakes his wings—again master of all his beauty and his powers.

Many of the facts of the life history of this and other ducks have been observed and recorded, but that need detract nothing from the pleasure of rediscovering them, each for himself. Emerson touches a deep truth when he says, "The man who stands on the seashore, or who rambles in the woods, seems

to be the first man that ever stood on the shore, or that ever entered a grove, his sensations and his world are so novel and strange."

ATTENDANCE AT THE PARK

No better evidence of the constantly and rapidly increasing popularity of the Park could be offered than the figures showing the attendance of the present year, which have far exceeded all our estimates.

A comparative table of the attendance for the first five months of 1903 with the same period of 1902 will be interesting to all our friends.

	1903	1902	Increase	Decrease
January.....	21,405	12,958		1,553
February.....	42,134	124,155	20,970	
March.....	81,222	54,742	26,480	
April.....	133,664	36,031	77,533	
May.....	187,940	105,519	82,421	
Totals.....	456,365	241,455	216,463	1,553

These figures show the increase to June 1st over the same period of previous year to have been 214,910, or nearly ninety per cent., exceeding by a considerable number the increase for the entire year 1902 over 1901.

May has been a record month in all respects, attendance exceeding by more than 50,000 that of any previous month—the greatest attendance being May 10th, when the number of visitors reached 34,030, more than 6,000 above any previous day.

If the present large attendance continues throughout the year, as there is every reason to believe it will, we may well expect the grand total to considerably exceed a million.

PUBLICATIONS

FIRST ANNUAL REPORT	Paper, 40 cents
SECOND " "	Paper, 75 cents. Cloth, \$1.00
THIRD " "	" 40 " " 0.60
FOURTH " "	" 40 " " 0.60
FIFTH " "	" 75 " " 1.00
SIXTH " "	" 75 " " 1.00
SEVENTH " "	" \$1.00 " 1.25

NOTES ON THE MOUNTAIN SHEEP OF NORTH

AMERICA. (Hornaday). Paper, 40 cents

DESTRUCTION OF OUR BIRDS AND MAMMALS

(Hornaday). 75 cents

THE CARIBOU. (Grant). Paper, 40 "

BULLETIN No. 1. 50 "

BULLETIN Nos. 2, 3, and 4. 10 "

BULLETIN No. 5. 15 "

BULLETIN No. 6. 15 "

BULLETIN No. 7. 15 "

BULLETIN No. 8. 15 "

BULLETIN No. 9. 15 "

BULLETIN No. 10. 15 "

The publications are for sale at the Office of the Society, 11 Wall Street, The Zoological Park, and The New York Aquarium.



PHOTO BY E. R. SANBORN.

WALL TANK AT THE AQUARIUM.

Showing new rockwork background.

THE NEW ROCKWORK BACKGROUND

AT THE

NEW YORK AQUARIUM

ATTENTION is called to the photograph in this number of the Bulletin, showing the character of the new rockwork linings now being placed in the exhibition tanks at the Aquarium. It has long been apparent to visitors to this popular institution that the lining of white tiles in the fish tanks does not form a suitable background for the beautiful collections exhibited in them, and that the effect of this background is monotonous in the extreme, being the same for all species exhibited in the lower series of wall-tanks, whether native or foreign. The same is true of the large floor pools in the building, and the entire collection of fishes, embracing usually about 150 different species, has been exhibited under very unfavorable conditions. Animals in a state of nature, are acted upon by their environment, and their color being more or less dependent on their surroundings, experience has shown that there has undoubtedly been a loss of color as a result of the whiteness of the tanks containing the species at the Aquarium.

The lining of white tiles, which has given the tanks somewhat the appearance of a series of bath-tubs,

is being removed steadily, and a lining of cement substituted. After a few weeks the cement takes on a rich brown tone which is more agreeable to the eye. It is not obtrusive, and the fishes can be viewed with greater comfort against this negative background. Rockwork will replace the cement lining as fast as suitable rock can be procured.

About a dozen tanks have already been converted into marine grottos experimentally, and it is believed that every tank in the Aquarium should eventually be made to represent a sea cavern as naturally as possible. It is not easy to do this, but a search is being made along the coast for wave-worn rock, and with the aid of photographs taken under the cliffs at low tide, a number of very interesting sea pictures can be worked out.

With the introduction of star-fishes, sea anemones, crabs and other creatures which cling more or less to the rocks, the exhibits will have a still greater interest for the public.

Sea-weeds of various colors are being introduced into the salt-water tanks, while fresh-water plants will be used for decoration in the tanks containing the fresh-water species.

The charming effects to be found in some of the public aquariums of Europe are chiefly due to treatment of this character.

Another advantage of the rough background of rockwork, with sea-weed, is the apparent interest which the fishes themselves take in exploring the

different corners of the tanks, and there are indications that some of the tropical species, which had undoubtedly lost color in the white tanks, are regaining their natural brilliancy in their new surroundings.

The treatment of the fresh-water tanks, where it is desirable to represent in some form the banks of streams, is much more difficult, but cement is a plastic material, and backgrounds can be constructed that will be vastly more satisfying to the eye than mere tiled walls.



The Bird House, for perching birds, will probably be undertaken during the summer, and completed within a year.

* * *

The Ostrich House contract will be awarded during the coming summer, and the building should be completed early in the spring of 1904. This structure is 166 by 32 feet, and will contain fourteen interior cages, each 10 by 11 feet, connecting with outside yards.

* * *

The small Mammal House, designed for small mammals of all kinds, up to the size of a large kangaroo, will be erected simultaneously with the Ostrich House, and will occupy the site of the temporary building which now stands near the Burrowing Rodents' Quarters. This building is 150 feet long, by 42 feet wide, and contains a line of cages along each side, both outside and in. It will contain 104 cages, and each interior cage will have a corresponding cage in the open air.

RECENT ARRIVALS

MAMMALS

One Green Monkey, 1 White-faced Sapajou, 1 White-throated Sapajou, 2 Mandrills, 2 Lynx, 1 Black Bear, 5 Red Foxes, 2 Raccoons, 1 Red Coati-Mundi, 1 Water Buck, 2 Olympian Elk, 2 Crawshaw's Zebras, 3 Musk Rats, 1 Olive Agouti, 1 Red Squirrel, 1 Gray Squirrel, 1 Kangaroo Rat, 1 Road Rat, 3 White-footed Mice.

BIRDS

Six Florida Cormorants, 1 Brown-headed Gull, 1 Herring Gull, 1 Ring-billed Gull, Black Ducks, 2 Java tree Ducks, 7 Red-head Ducks, 3 Blue-winged Teal, 2 White-fronted Geese, 8 Brant Geese, 4 Pint-tailed Ducks, 4 Green-winged Teal, 8 Flamingoes, 1 Crested Screamer, Purple Gallinule, Florida Gallinule, 5 Sultana Gallinule, 2 Black-black Gallinule, 9 Great Blue Herons, 10 American Egrets, 8 Little Blue Herons, 3 Louisiana Herons, 2 White Storks, 1 English Pheasant, 2 Peacocks, 1 Peahen, 3 Bald Eagles, 1 Red-tailed Hawk, 1 Broad-winged Hawk, 4 Red-shouldered Hawks, 5 Sparrow Hawks, 1 Great-horned Owl, 2 Barn Owls, 1 Gray Screech Owl, 1 Screech Owl, 1 Golden Crowned Parakeet, 1 Green Cheeked Amazon Parrot, 2 Le Vaillant's Amazon Parrots, 2 Cockateels, 1 Blossom-headed Parakeet, 2 Large-billed Tyrant Fly-catchers, 2 Western Meadow Larks, 1 Indigo Bunting, 1 Purple Finch, 1 English Song Thrush, 2 Black-headed Caiques.

REPTILES

Four Alligators, 1 Star Tortoise, 12 Painted Turtles, 8 Spotted Turtles, 2 Musk Turtles, 1 Texas Rattlesnake, 11 Banded Rattlesnakes, 2 Ground Rattlesnakes, 2 Cobra-de-Capellos, 5 Coral Snakes, 3 Chicken Snakes, 2 Green Snakes, 200 Garter Snakes, 1 Mud Puppy, 4 Red-bellied Salamanders, 3 Spotted Salamanders.

BIRTHS

MAMMALS

Eighty-two animals have been born in the Park since the beginning of the present year. This shows a considerable increase over the total number of births during 1902, which numbered forty-two animals. The following is a list of the animals born in 1903: One Long-armed Baboon, 3 Leopards, 4 Lions, 1 Russian Bear, 8 Timber Wolves, 8 Coyotes, 5 Mearns' Coyotes, 1 Horse-tailed Deer, 2 Florida White-tailed Deer, 7 Fallow Deer, 1 Red Deer, 2 Prong-horned Antelope, 2 Punjab Wild Sheep, 2 Aoudad, 1 Mouflon, about 30 Prairie Dogs, 10 Coypu Rats, 1 Mongoos Lemur.

GIFTS TO THE AQUARIUM

SPECIMENS

Twenty-six Goldfish, Green Turtle, 1 Tortoise, 1 Painted and 1 Wood Turtle, 1 Diamond-back Terrapin, 3 small Alligators, 16 Salamanders, and a number of specimens of Salamanders and Bullfrogs from different sources.

BOOKS

New York State Fish Commission: Reports for 1898 and 1900. New Jersey Fish and Game Commission: Reports for 1901 and 1902. Massachusetts Fish Commission: Reports from 1860 to 1902. California State Fish Commission: Reports 1891-2, 1899-1900, 1901-02, and 2 miscellaneous papers. Director of the Aquarium, Amsterdam: Copy of the "Feestnummer" (50th anniversary vol. Amsterdam Zoological Society).



TASMANIAN WOLF.



HYENA DOG.



CROWNED CRANE



PARADISE CRANE.



WHOOPING CRANE.



LION CUBS.



PUNJAB LAMBS.

PHOTOS BY E. R. SANBORN.

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THE SNOW LEOPARD.

OF ALL members of the Cat Family that come to a modern Lion House, none is more welcome than the Snow Leopard, or Ounce, (*Felis uncia*). This creature is at once beautiful, good-tempered, and of exceeding rarity; and what more can we ask of one animal?

Eighteen months ago, an order for a pair of Snow Leopards was placed with Mr. Carl Hagenbeck, with no time limit. One year ago, a pair in Calcutta was purchased in London, but both animals died prior to shipment. Out

of four specimens collected by Mr. Hagenbeck's agents near the northern border of Thibet, and shipped to Hamburg via Mongolia, three died in transit. The fourth reached the Zoological Park four weeks ago, not only alive, but in excellent health and spirits. It comes as the gift of Mrs. Emma B. Auchincloss.

The Snow Leopard, or Ounce, is a leopard of the high altitudes, from the northern slope of the Himalayas to the Altai Mountains of Mongolia. Its home is above an elevation of 9,000



PHOTO BY E. R. SANBORN

THE SNOW LEOPARD, OR OUNCE.

Gift of Mrs. Emma B. Auchincloss.

feet, and it is the neighbor of Marco Polo's sheep, the giant-horned argali, and the Siberian ibex. One of the last pictures painted by the late Joseph Wolf was of an Ounce stalking a bunch of *Ovis poli* in deep snow.

In its home country, this animal is by no means exceedingly rare. Captain Thomas Golding was surprised to learn at Shanghai that sometimes as many as 2,000 tanned skins of the Snow Leopard come to that port from the interior of China in a single year. But not one live specimen ever accompanies them. The distance is too great, and the difficulties to be encountered with a live animal in a cage are too numerous to tempt even a Chinaman to try to surmount them. As a result, the very few specimens that have been seen in captivity have either been brought from the Himalayas down through India, or from western Mongolia, through Russia. Naturally, these animals are costly; and the price of our specimen was \$900.

To-day, there are only two other Snow Leopards in captivity in zoological gardens, one of which is at London, the other at Berlin. Our specimen is a fine male, nearly full-grown, and in perfect condition. It is about the size of a medium-sized puma, but proportionately the Ounce does not stand as high upon its legs as a puma of the same length. From ears to tail-tip it is very heavily furred. Its most conspicuous and striking feature is its enormous tail, which is quite as long as the body. The ground color of the pelage is a warm buff-gray, on which is blended rather faintly large

rosettes and spots of dull brown. The forehead is conspicuously high, which gives the animal a very pleasing profile. At all times, the attitudes of this animal are very statuesque.

Being a creature of the snows, "Chang" has been placed in one of the small outdoor cages of the Lion House, where he will remain, winter and summer, with the Manchurian leopard as his next neighbor. He endured his long journey without worry or distress, and at the end of it walked out of his traveling box as serenely as if he knew that he had reached home.

The Ounce is the most cheerful and good-tempered of all the spotted Cats—precisely the opposite of the black leopard, whose satanic temper invariably matches its color. "Chang" is as good-tempered as a house-cat, and when fed is as playful as a kitten with a live mouse. Its daily ration consists of a chicken, well cleaned and plucked, offered about six o'clock, when everything is quiet.

As soon as the food is handed in, the performance begins; and whenever the animal is given the freedom of the huge, rock-furnished cage next door, the sight is most interesting. Up to the top of the rocks dashes the Ounce, until the highest point is reached. Often the chicken is thrown high into the air, and as it falls the animal leaps over it. Sometimes it is thrown or dropped over the edge of the rocks, and "Chang" leaps after it—pretending that it is alive, and trying to escape. After the play is over, the chicken is taken to the water pan, and carefully washed before it is eaten!

POISONOUS SERPENTS OF THE NEW WORLD.

By RAYMOND L. DITMARS,
CURATOR OF REPTILES.

AT no time since the opening of the Reptile House have the poisonous serpents been so thoroughly represented by species from various parts of the world. There are on exhibition at the present time in the Reptile House sixty specimens of poisonous snakes, representing eighteen species.

Of those which inhabit the New World, the following species are shown:

Diamond-Backed Rattlesnake, (*Crotalus adamanteus*), Florida.
Texas Rattlesnake, (*Crotalus adamanteus atrox*) Texas.
Prairie Rattlesnake, (*Crotalus confluentus*), Texas.
Tiger Rattlesnake, (*Crotalus tigris*), California.
Banded Rattlesnake, (*Crotalus horridus*), New York.
Ground Rattlesnake, (*Sistrurus miliarius*), Fla.

Massasauga, (*Sistrurus catenatus*), Nebraska.
Copperhead Snake, (*Ancistrodon contortrix*), New Jersey.

Water Moccasin, (*Ancistrodon piscivorus*), South Carolina.

Fer-de-Lance, (*Lachesis lanceolatus*), Martinique.
Bushmaster, (*Lachesis mutus*), Trinidad, South America.

Coral Snake, (*Elaps fulvius*), Florida.

The venomous serpents of the New World are represented by twelve species, ten of which inhabit the United States. Of these, the largest is the Diamond-Backed Rattlesnake, which attains the greatest dimensions of any of the venomous serpents of North America, occasionally measuring seven, or even eight feet in length. The specimen on exhibition slightly exceeds six feet, and feeds regularly every week upon a medium-

sized rabbit. Usually this species is regarded as a very "shy feeder" in captivity. Some specimens never can be induced to eat, and after remarkable fasts of from six to eight months, ultimately die of starvation. The fangs of this formidable reptile are of greater length in proportion to the serpent's size than in any other of

few can fail to appreciate Nature's taste and generosity in the distribution of brilliant tints.

Although this peculiar color characteristic in the Banded Rattlesnake is very constant, it sometimes happens that in New York, New Jersey, Pennsylvania and the neighboring States, black females are occasionally found. The writer has, however, never examined a yellow male from the district described. In the South, where its surroundings are quite different, the Banded Rattlesnake assumes an entirely different color phase from the northern specimens.

The northern form is essentially a mountain snake, and inhabits rugged, rocky country. In the South this species lives in swamps, and the neighborhood of bayous. It seems especially partial to dense growths of cane, and throughout the southeastern States is known popularly as the Canebrake Rattlesnake. The latter form is characteristic and constant in its markings. Males and females incline towards a salmon pink traversed by bands of black. Strikingly peculiar to this form, and very constant, is a distinct line of rusty red, running almost the entire length of the back, to the width of about three scales. Such specimens are found in Georgia, Alabama, South Carolina, Mississippi and Louisiana. This southern form grows to such a size that it rivals



PHOTO BY E. R. SANBORN

PRAIRIE RATTLESNAKE

the North American poisonous reptiles. All the viperine snakes of the tropics and sub-tropics appear to possess fangs of larger proportions than those of serpents of the temperate zone. For example, we observe that the fangs of the Fer-de-Lance, a tropical species, are proportionately larger than those of the most dangerous snake of the United States.

Closely allied to the "Diamond-Back" is the pugnacious Texas Rattlesnake, a species of the south-western deserts, which in its body coloration approaches to a remarkable degree the shades and tints of the arid wastes of western Texas. The rattles of this snake are so well developed that the two lusty specimens in the Reptile House can be distinctly heard above the rattling of the entire collection of rattlesnakes when they are disturbed.

The most beautiful of these serpents is the Timber, or Banded Rattlesnake. North of South Carolina, this species exhibits peculiar variations of color. The majority of the males are black, and some so intensely black that the entire upper surface is without a suggestion of bands. The females, to the contrary, are a brilliant sulphur yellow, ornamented with transverse, irregular black bands. Sometimes these bands assume the form of a chain of rhomb-like markings down the back. A freshly-shed female of this species is one of the most beautiful of snakes, and no matter how strong may be the prejudice,



PHOTO BY E. R. SANBORN

COPPERHEAD SNAKE

the Diamond-Backed Rattlesnake, but it is a more slender reptile.

Contrary to the usual reputation of venomous snakes in captivity, the Water Moccasin is the most hardy reptile that has come under the writer's observation. It is an omnivorous feeder, taking rabbits, rats, birds, frogs, fish and snakes other than its kind, with the same degree of voracity. The specimens in the Reptile House, being captive bred, and feeding frequently and

substantially, have grown to very large size, several specimens being three inches in diameter.

Repeated experiments have been made with a view to keeping on exhibition specimens of the brilliant little Coral Snake, of our southern states. This eccentric reptile, however, will not thrive unless given plenty of earth and moss in

snake is almost instantly fatal to birds and small mammals, but it must be explained that the venom does not always figure in such sudden deaths. The fangs of this species are so enormously developed that a well-aimed stroke often sends them into the vitals of a small creature.

One of the latest accessions to the Reptile



PHOTO BY E. R. SANBORN.

WATER MOCCASIN.

which to burrow. All the specimens placed in cages where they were forced to show themselves to visitors have died within a few months. This peculiar reptile possesses such brilliant colors as to appear grotesque among serpents. It is strictly cannibalistic in captivity, and feeds only upon snakes and lizards. When annoyed, it does not "strike," as do other poisonous snakes, but twists and turns like a spring possessed with life. Should anything of interest come within reach of its jaws, it quietly but decisively takes hold with bull-dog tenacity, and bites and chews with its tiny fangs until they are imbedded to their utmost length. The writer fully believes that this tiny, but formidable serpent, so closely related to the cobra and its allies, is fully as poisonous in proportion to its size as its deadly Indian relative. Its bite is quickly fatal to other reptiles of small size.

One of the most interesting specimens in the Reptile House is a full grown female of the West Indian Fer-de-Lance, (*Lachesis lanceolatus*), a snake closely related to the copperhead and water moccasin. This fine specimen was procured about a year ago. Contrary to the ill repute of the dreaded lance-headed snakes of the West Indies and tropical South America, it is very quiet, and feeds regularly. The bite of this

House is a specimen of the South American Bushmaster, representing the largest species of poisonous snake inhabiting the New World. Terrible weapons are the fangs of this huge pit-viper, attaining in a specimen eight feet long, a length of an inch and a quarter.



PHOTO BY E. F. KELLER.

WEST INDIAN FER-DE-LANCE.

This makes the second Bushmaster to arrive at the Park alive, and we can now boast of being



PHOTO BY E. R. SANBORN.

BUSHMASTER.

quite unique among the institutions in this country, in possessing two living specimens of this rare and interesting reptile.

In captivity the Bushmaster usually refuses all food, but as these specimens will be at first fed forcibly to strengthen them after the shock that attends the capture of such nervous creatures, it is hoped that they will ultimately feed and thrive, as has the *Fer-de-lance* that will share their cage.

THE MAINTENANCE OF AN AQUARIUM EXHIBIT.

An astonishing number of visitors to the New York Aquarium after viewing its collection of two thousand specimens, representing nearly two hundred species, crowded into one hundred tanks, are constantly inquiring why octopus, white whales, sea-cows, man-eater sharks, and a host of other marine animals they have heard of are not exhibited. Consequently it is desirable to give readers of the *BULLETIN* some idea of the obstacles encountered in maintaining an aquarium collection.

It is much more difficult to procure and keep *living* animals than dead ones, as the former are harder to catch, transport, feed and maintain under proper conditions, than the preserved specimens of a museum, and this is truer in the case of an aquarium than in that of a zoological garden. The difficulties may be mentioned in part as follows:

Capture of the animals without injury; transportation by wagon and rail without injury; the delicate nature of many species; the supply of proper food; sufficient water space for freedom of movement; necessary high temperature for tropical species; necessary low temperature for northern species; absence of scientific knowledge respecting the diseases of fishes; expense of catching and transporting large specimens; unforeseen accidents which may stop the pumps or foul the water supply, and not least the enthusiasm of visitors, who strike at the tanks with hats or newspapers to frighten the specimens into wild dashes which kill or bruise them.

In the capture of specimens it is almost impossible to make fishermen understand the necessity of careful handling. Perhaps fifty per cent. of all fishes taken alive for exhibition are lost during the first two or three weeks, the first loss being at the time of capture, the second during transportation, and the third resulting from the development of injuries received. Even among sound specimens that have become accustomed to the tanks, there is a further percentage of loss from month to month on account of the fish fighting among themselves, while, even with constant care, the water supply and its changes in temperature may give trouble.

Large fishes are very difficult to transport, as well as to catch. Tanks containing sufficient water to keep them alive during shipment are enormously heavy, and as water animals cannot endure the delays of freight service, the bills for expressage are large. Very few living fishes can be shipped without attendance. They must be "personally conducted," which adds passenger fares to express rates. Where a circulation of water cannot be kept up en route as on steamers, the tanks must be aerated artificially, and water added by any means available. It costs more to transport one big sturgeon or shark than five hundred small fishes, and the chances of having something to exhibit in the end are much less. It is cheaper and safer to send a lot of king-crabs to England than to bring one large-sized sturgeon from the Delaware River.

Nevertheless the New York Zoological Society intends to introduce any large fish, seal, porpoise, manatee or octopus that can be secured. Although funds are limited, good prices have been offered in vain for seals, sturgeons, and porpoises. They are not on the market, but some of them will undoubtedly be secured before long.

The food of fishes in captivity is varied, consisting of chopped meat, liver, clams and fish, while live food, such as minnows and small crustaceans is supplied as regularly as possible. Manifestly the tropical fishes cannot have their home bill of fare in New York, although considerable expense is incurred in tempting their appetites. The more delicate species gradually die off from lack of proper food, while the hardier kinds adapt themselves to what the market affords, and the Aquarium collector can pick up along the coast. Like land animals in captivity, individual fishes may refuse all kind of food for weeks.

Tank space must be considered in all public aquariums, as active fishes suffer from lack of room for movement, and at times make strong efforts to get out of the tanks.

Captive fishes are often alarmed by visitors, and a badly frightened fish may die very quickly. A bruised specimen soon develops the dreaded fish fungus, which may disfigure and eventually kill not only the injured fish, but infect and destroy others in the same tank. A fungus which destroys many captive fresh-water fishes, even specimens which have not been outwardly injured, is the plant parasite *Saprolegnia*. It is sometimes possible to destroy this growth by making the water more or less salty, or even dipping the fish for a few moments into a very salty solution. Applications of formalin are fairly effective in mild cases, but fishes cannot endure very strong medicine, and as the delicate skin of the fish may be further injured by handling,

the treatment of fish injuries has so far not been very effective. When diseased fishes are of species easily procured, it is best to throw them away and get fresh ones.

On the whole, the necessity of doing everything *under water*, and pure water at that, is what makes aquarium work difficult. Taking fishes entirely out of water, even for short periods, is about as risky as putting men entirely into it.

As to fighting among fishes, a number of "bullies" may harass the life out of their smaller companions, and tank space, in our crowded aquarium cannot always be afforded for separating such individuals. Amiable species are necessarily housed together. The angel-fish for instance, is often anything but angelic in its bearing. One rowdy may do irreparable damage in a single night.

The New York Aquarium maintains four distinct water systems; warm and cold for ocean species, and medium and cold for fresh water types. In mid-winter the water for tropical forms is daily heated from 38 to 70 degrees, and in summer a refrigerator system is put into operation for the benefit of the trout and salmon groups.

The salt-water collections in the New York Aquarium have always been maintained under unusual conditions, as the water of New York Bay, which is kept constantly flowing through the tanks, has a very low saline density. During the winter months, when the river is high, the so-called sea water in the Aquarium is four-fifths fresh. Even in summer when it is at its best, it is never more than half the density of the open ocean. While a fair proportion of ocean fishes gradually adapt themselves to these conditions, it is almost impossible to keep the more delicate invertebrates. Some kinds of star-fishes, crabs, and sea-anemones can stand it, but such quantities of the more delicate forms have been lost, that attempts to introduce them have been discontinued. Recently a member of the Society offered to assume the cost of an exhibit of octopus. The Director procured several specimens, but not one survived more than a few hours after being placed in the brackish water of the Aquarium. The floods of the Hudson River saturate and soil the waters of the Bay, and destroy more or less sea life in the Aquarium every winter.

When the construction of the proposed salt-water reservoir provides the Aquarium with a good supply of pure water from the open ocean, many beautiful creatures from along our coasts can be introduced.

Except in the case of the hardest species, no aquarium collection ever amounted to anything that had not intelligent and faithful care. The luxury of blunders cannot be indulged in—it is too expensive. Eternal vigilance and considerable money are what make a public aquarium possible.

C. H. T.

THE WHITE HERON.

A fine specimen of the largest and rarest of all our dozen species of North American Herons, has been recently added to the col-



PHOTO BY E. R. SANBORN.

WHITE HERON.

lection in the Zoological Park. This is the Great White Heron (*Ardea occidentalis* Aud), of whose habits little is known. It is said to inhabit Cuba, Jamaica, and the southern extremity of Florida. In the latter locality it is very wary and difficult of approach, even during the nesting season. Unlike most herons it is a solitary bird, its nest being built away from others of its kind; generally placed in a mangrove tree, on some small isolated coral island, or "key."

BIRD PROTECTION IN SOUTH AMERICA.

From "White Herons and Red Bises," translated from the Portuguese by Wm. Clifford, and arranged for the Bulletin by C. William Beebe.

There is little doubt that the appropriateness of the term, the *Dark Continent*, has been lifted from Africa and transferred to our own hemisphere. The interior of South America is one of

the few unexplored lands left to the naturalist and explorer.

Even to this distant land the despicable plume hunter has penetrated, and for years wrought his customary havoc among the more brilliant waterfowl.

Putting to shame our delayed legislative acts for the protection of our birds, Dr. Emil A. Goeldi, Director of the Museum at Para, Brazil, several years ago presented two "memorials" to the Governor and the legislature of the State of Para, "Against the Destruction of White Herons and Red Ibises on the Lower Amazon." These are written in a masterly manner, with the deep and sincere feeling of a lover of Nature who looks into the future and foresees the desolation of a birdless world.

In his memorial Dr. Goeldi first calls attention to the beauty of the white herons and scarlet ibises. "Can there be a scene of Nature, a landscape more picturesque, than the margin of one of our lakes that is solemnly guarded by an interminable file of those white forms which, on our approach, dissolves into a cloud of snow, carried at times in a spiral, as if driven by a strong blast of wind?"

"There are men who do not hesitate *** to slaughter hecatombs of these superb creatures, to pluck out a few paltry feathers, of which it is necessary to get thousands in order to weigh a single kilogramme of the horrible merchandise."

In speaking of the habit which these birds have of coming long distances from the upper Amazon to feed and nest on certain favorite islands near the mouth of the river, Dr. Goeldi says, the remembrance of these places has become an intellectual property, received by inheritance. "Consequently the horrible carnage produced by the feather dealers *** affects not only the herons that normally live on the said island, but the herons of a vast region of the Amazon in general."

He then states that the herons eat dead fish and offal, as well as living food, and thus are valuable scavengers.

He advocates a short open season for herons, if the nefarious hunting cannot be altogether prohibited, and a heavy tax on exported plumes.

In the second "memorial" he says there is a "manifest lessening of game in the southern

portion of Brazil," and he quotes from a traveller who says, "I know little bays which formerly were white with herons, and today it is hard to find there a single bird."

We are told that two hundred thousand dollars worth of herons' plumes are annually exported from Para. In advocating a heavy tax he says, "Export rubber pays a duty, farm products pay a duty, and everything that represents the fruit of sweat and honest labor pays a duty, while this abominable merchandise, that is the spurious offspring of idleness and murder, goes out scot free."

In the last few paragraphs he sets forth an entirely new phase of bird protection, which merits serious consideration.

He says, "with the increasing *pterygomania* (*venia sit verbo!*) of the female sex *** were not the ostriches threatened with extermination?" And this problem is solved permanently by ostrich farms. He cites the South American Indians who were noted for their feather-work, and who took precaution to breed macaws and parrots to furnish material for their work.

Then follows a brief from the German journal *Gartenlaube* on the subject of "Heron Farming." The following is worthy of note. A gentleman in Tunis built a large *volière* or flying cage, and stocked it with thirty young herons, which bred with great rapidity, in a comparatively short time increasing to three hundred and eighty-seven birds. The flesh of dead horses and donkeys is fed to them. Twice a year they are plucked, each bird yielding six grammes of feathers, resulting in a remarkable net profit, as heron plumes by weight are almost twice as valuable as gold.

The success of ostrich farming is attested by the Cape of Good Hope output which in 1895 yielded the sum of \$106,000,000.

If the experiment of the gentleman in Tunis was a purely speculative one, and yet was successful, what results may we not ultimately hope for in the Zoological Park in colonizing some of our vanishing species of birds, inspired, as we would be, by the thought that these individuals are the sole living representatives of their kind!

ZOOLOGICAL SOCIETY BULLETIN

EDITED BY THE DIRECTOR.

Elwin R. Sanborn, - Asst. Editor.

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ONE YEAR HENCE.

The end of the next twelve months will reveal an important advance in the development of the Zoological Park.

The Antelope House and its twenty-two yards outside will be ready for use about November 1st. The building of an Ostrich and Cassowary House, 170 feet long, began last week; and at the same time there began, under the same contract, the erection of a Small Mammals' House, 170 feet long.

A contract for the large Bird House was awarded on September 14. Plans for a large Deer House are now in course of preparation. The Llama House will be ready for use by September 20, and the entire collection of animals for it will arrive about Oc-

tober 1 as the gift of Mr. Robert S. Brewster. Of this fine gift a full notice will appear in the next issue of the BULLETIN.

September 1, 1904, will find the Park in possession of four first-class buildings, and at least two smaller ones, beyond what are available to-day. We expect, also, to erect during the next twelve months the permanent Pheasants' Aviary, and also a large house for small deer. The surface of the south half of Baird Court will be fully improved at an early date, and in all probability will be completed early in 1904.

IMPORTANT GIFT OF ANIMALS.

All persons who are interested in the success and permanence of the great private game preserves of the United States will learn, with sincere regret, that the Honorable William C. Whitney has decided to remove the herds of buffalo, elk, and mule deer from his fine preserve on October Mountain. This reservation occupies a plateau on the mountain top, at an elevation of between 1,000 to 2,000 feet, and is seven miles from the town of Lenox, Mass.

That the site was well chosen as a home for hardy hoofed animals, the fine condition of the herds on October Mountain abundantly attest. So far as we are aware, there is no fenced preserve in which the species named above have thriven better, multiplied more rapidly, or developed more finely. In the interest of game preservation in the United States, the Director of the Zoological Park some months ago made an earnest effort to dissuade Mr. Whitney from his intention to dispose of his herds, but he was not prevailed upon to reconsider his decision in the matter.

Originally the herd of elk on October Mountain contained 78 animals, the buffalo herd 38, and the herd of mule deer between 25 and 30.

When the unsatisfactory condition of the elk and buffalo herds of the New York Zoological Park were made known to Mr.

Whitney, accompanied by a suggestion of relief measures, he promptly presented to the Zoological Society his entire herd of buffalo, excepting a few specimens which had already been sold, and as many elk as the Society desired. Already, the Park has received ten magnificent specimens of *Cervus canadensis*, consisting of four males and six females—practically the pick of the entire herd. The four males, which are of great size, all carry large antlers, and in their new range present a most imposing appearance. It is doubtful if there are on foot to-day any wild specimens of this species which surpass these splendid creatures.

Each one was crated separately on October Mountain, hauled to the railroad, and within thirty-six hours, landed safely in the Zoological Park. They have not manifested the slightest nervousness on account of their new surroundings, and were not in the least disturbed by the 35,000 visitors at the Park who witnessed their arrival, and afterward inspected them, on September 6th.

The buffalo herd presented by Mr. Whitney contains 26 head, consisting of a general assortment of males and females, both young and old. The finest bull of the herd—a Wyoming animal, named "Apache," arrived on September 6th, and the remainder of the herd will follow as rapidly as it is possible to crate and ship the animals. The Park has never before been so well prepared to receive a buffalo herd as it now is. The two ranges have been thoroughly under-drained, and put in the best possible condition, besides which a division fence has been run in an east and west direction across the centre of the main range, which will have the effect of keeping the herd sufficiently near to the walks provided for visitors that the animals always can be seen to good advantage.

Members of the Society will recall the fact that previously Mr. Whitney presented to the Zoological Park two fine buffalo bulls—"Cleveland" and "McKinley." Thus far, no one else has specially contributed to the buffalo herd of the Park. With the arrival of the splendid contribution from October Mountain,

the herd will stand, for all time thereafter, as Mr. Whitney's gift.

In this connection, it is a pleasure to call attention to the fact that the entire herd of red deer, and also that of fallow deer—both of which are in most satisfactory condition—have come to the Society as the gift of Mr. William Rockefeller. As mentioned elsewhere, the collection of llamas, guanacos, vicuñas, and alpacas, to be installed within a few days, will come as the gift of Mr. Robert S. Brewster.

The members of the Zoological Society, in particular, and the public, in general, are to be congratulated on the important and valuable additions to the Zoological Park herds that have recently been made. It is particularly gratifying that two of the finest species of North American animals—the buffalo and the elk—should henceforth be so perfectly represented in the Zoological Park as Mr. Whitney's generous gift has made possible.

W. T. H.

All previous records for attendance in the Zoological Park, were completely eclipsed on Sunday, September 6th, the turnstiles indicating that 35,667 persons had passed through the entrances. The total for the first seven days of September, 1903, was as great as for the *entire month* of September, 1902, and over 800 guide books were sold on Sunday and Labor Day. The attendance for August was 155,000, an increase of 29,000 over the same month of the previous year.

The fees for membership in the New York Zoological Society are as follows:

Annual membership.....	\$ 10.00
Life membership.....	200.00
Patron's fee.....	1,000.00
Founder's fee.....	5,000.00
Benefactor's fee.....	25,000.00

Information and blank forms for membership, may be obtained at the Service Building, at all entrances to the Zoological Park, and at the Secretary's Office, No. 11 Wall Street, New York City.



OSPREY'S NEST IN THE ZOOLOGICAL PARK.
Transported from Gardiner's Island.

BUILDERS OF GREAT NESTS.

By C. WILLIAM BEEBE.

CURATOR OF BIRDS.

Illustrations from photographs by author.

A SUDDEN rush of wings, a mighty splash, and a glimpse amid the spray of shining fish-scales and great yellow talons! Such an exciting introduction to the American osprey or fish-hawk was a tempting one to follow up, and subsequent meetings have proved these birds to be most interesting acquaintances.

Most of our hawks and other birds of prey, from their apparently cruel custom of feeding on smaller birds, do not arouse the love and sympathy which is excited by the study of birds of less rapacious habits, but we must not include all hawks in this sweeping condemnation, for the ospreys are remarkable exceptions. These striking birds inhabit almost the whole length of our Atlantic sea-coast, where it is not a rare sight to see a fish-hawk hovering over its favourite fishing-ground and occasionally dashing down—meteor-like—into the waves, the impetus or the struggle of the fish, even forcing the bird under water. With dripping wings the hawk rises and circles upward, its finny prey writhing in the grip of the steel claws. When it is satis-

fied with the altitude, the great wings are set and a straight line taken in the direction of the nest.

The homes of these birds—great masses of sticks which are visible for long distances—are usually built in dead trees. Generally they are several miles apart, but in certain rare localities many pairs of birds may be found nesting in close proximity. Gardiner's Island, not very far from New York, is such a favored spot, years of freedom from persecution rendering the birds tame and easy to study. In fact, this island has become a perfect paradise for birds of all kinds. There are no cats, weasels or minks, the ospreys drive away other birds of prey. Most important of all, the owner is a warm friend of all the birds and they know it. Robins nest in every crevice on the front porch of his house; the fence posts around the yard hold many nests of flickers; swifts revel in the chimneys; bob-whites and pheasants run about fearlessly near the house, and woodcocks brush by our heads at dusk.

Some distance away a colony of black-crowned night herons is established, and near the shore in

the clay cliffs back of the house, a hundred or more bank swallows make their home. In three days over fifty species of birds were seen in numbers. In a stroll through a high grass meadow we came across a family of wild rabbits, basking at the mouth of their burrow, each pair of ears pricked up but so fearless that the little

just above high water mark. Think of walking along the beach and occasionally reaching out one's hand to examine and admire a trio of beautiful chocolate-spotted eggs, or the helpless little drab-colored ospreys, or even full-fledged young birds!

These fish-hawks which build on the beach are sometimes harassed by the terns or sea-swallows whose eggs and young lie among the pebbles in all directions. The baby terns take quite long excursions over the sand which they so much resemble, and when their wanderings lead them too near the ospreys' nests, the intentions of the hawks returning with fish are misconstrued and the poor fish-hawks have to dodge and crouch as the mother terns swoop at their heads.

When young ospreys hatch they are very different in colour and appearance from the brown and white older birds. Pot-bellied and blind, they tumble and roll about helplessly enough. They are covered with a clay-coloured down and have a black streak running through their eyes. Whether this peculiar coloration hints of ancestral markings we cannot say, but the little fellows have one character which bids us look back many thousands of years for its explanation. Each tiny thumb has a distinct and perfect claw at the tip, very small but probably of some use to the little bird in scrambling about the nest—a true reptilian vestige. Ospreys of this tender



OSPREYS AND NEST.
Gardiner's Island.

fellows show no alarm at being lifted in the hand. Farther on, from under our very feet, a brown hen pheasant flies up, and goes booming away for a few yards. Disregarding her attempts to make us follow, we search carefully around, and at last spy a dozen tiny forms crouching close to the rough ground—perfect copies in miniature of the mother. So obedient are they to her warning calls that when taken up they move not a muscle, utter not a sound. Tossed into the air, they flutter a short distance and at the old bird's cluck, drop like stones into the grass. There are probably two hundred osprey's nests on this island, as many as twelve or fifteen being visible from one spot.

The individuality of each pair of birds is strongly marked by the position and composition of its nest. They are built, as a rule, in the tops of trees, but, in many instances, fresh material having been added year after year, the tree has become top-heavy and has fallen. The wonderful preference which these birds show for a site once selected leads them, not infrequently, to utilize the fallen wreck of their home as a basis for subsequent additions.

The most remarkable change in the habits which the fish-hawks exhibit, on this island, is shown by the beach nests—huge, flat-topped collections of sea-weed, drift-wood and other materials built on the pebbles along the shore,



YOUNG OSPREYS.
Gardiner's Island.

age are fed on partly digested fish provided by their parents, but later whole fish are brought and torn to pieces in the nest.

The young hawks, which, by the by, remain a month in the nest, are wonderfully obedient. In the midst of repelling a supposed attack from my hand, with feathers ruffled threateningly and striking with beak and claws, they instantly drop

flat at the piercing alarm of the mother overhead, and become almost invisible, the colour of their backs and wings harmonizing with the surrounding sea-weed and other nest materials.

There are few of us who have not at one time or another enjoyed the delights of bird-nesting, whether to add new varieties of eggs to our collections, or more humanely, to gather the emptied homes of the little feathered masons, weavers and basket-makers which decorate the woods and fields. We may have been so fortunate as to have discovered the dainty cobweb air-castle of a humming-bird; very likely the deep, beautifully-woven purse of the oriole holding those curious hieroglyphic-marked nuggets, was taken by us from some elm, but probably the largest treasure in our collection was the unskilfully built nest of a crow—several pounds of sticks loosely put together.

In the New York Zoological Park is evidence of nest-collecting on a mammoth scale. On a promontory of Cope Lake is a tall weather-beaten tree, which supports in the topmost crotch a gigantic nest—the original home of one of the families of fish-hawks on Gardiner's Island. The nest alone weighs over four hundred pounds, and as the author can testify, it was no easy matter to transport this in the original crotch from the site where it was found, a grassy field near the shore where covies of pheasants, bob-whites and scurrying groups of snowy plover were the only observers, to its present position where crowds of people wonder at its proportions.

It is marvellous how birds, even as strong as these hawks, can carry sticks of such large size. Curious materials are mixed with these—broken oar-handles, pieces of wrecked boats, fishermen's nets, quails' skeletons, coils of rigging and even a long double strand of barbed wire, the latter serving admirably to help bind the general mass together. The lining of the nest is composed of large masses of sea-weed, in which are tangled shells, horse-shoe crabs and other evidences of marine life which are common on our shores.

This nest was selected after examining many others, being exceptionally compact and very accessible, only fifteen feet from the ground. The nest found, the next thing was to move it to a more convenient position, but when an attempt was made to saw off several interfering branches, the owners swooped down almost to my head, and as the swish of wings rose to a roar, I involuntarily winced at the angry screams and extended talons.

In the side of this huge structure are the nests of three pairs of blackbirds or purple grackles, these birds being intelligent enough to realize the protection from birds of prey which a close association with these fish-hawks insures. A curious circumstance is that the very next

morning following the erection of the osprey's nest in the Zoological Park, a blackbird spent most of the morning climbing over the structure and investigating the nests of his species. Could they have brought back to him—a bird now nesting in one of the trees of the Park—memories of his own nestlinghood?

"When the young ospreys learn to fly, they have no idea of the process of fishing, and have to be taught by their parents."

Such was the note which I made in my journal after watching the fishing lessons of several young ospreys. But one of the dozen fully fledged nestlings which I brought to the Zoological Park redeemed his species from the supposition that heredity has no part in helping the young birds to a knowledge of their life-habits. One day a fish was thrown beyond the line of cavernous-mouthed pelicans in the great outdoor flying cage, and a young osprey swooped at it and fell headlong into the water. He half kicked, half flapped his way to shore, and crawled out disappointed and bedraggled. The screams with which his companions welcomed him—were they jeers or shouts of acclamation? They should have been the latter, for was he not the only one who dared to do alone and untaught what a little parental instruction would have made easy for all!

The sight of the fish in the water was just the stimulus needed to give an impetus to an instinct, latent but trembling for expression. After the first blind yielding to impulse, experience enters in as guide and instructor, and a few more attempts made this young osprey master of his art. It is a significant fact that none of his companions ever attempted to imitate him, even though they had to wait longer for their meal, standing screaming on the bank until the fish were thrown at their feet. All, however, learned to fly perfectly.

Our brave little osprey was a pioneer among his kind. If he was living a free life, his "genius" would mayhap devise some improvement in osprey fishing—some little method would have been his, perhaps some wile to outwit the high-way robber of his hard-earned fish, the bald eagle. This he might have taught to his offspring, thereby giving them that chance for which Nature is ever waiting—just a little advantage with far-reaching results and of untold value in the constant struggle for existence.

How few enemies these birds seem to have and yet of the one hundred and fifty to two hundred pairs and trios of young ospreys which leave the Island every year with their parents on the southern migration, not more than a half dozen birds live to return and build nests of their own the following year. It is even said that notwithstanding the protection given, the

aggregate number of ospreys is lessening, such are the ravages of southern gunners and other causes of death in the far tropics. Their worst

foes on the Island are crows, which steal to the nests while the parent hawks are absent fishing and forthwith devour eggs and young birds.



PHOTO BY E. R. SANBORN.

MONKEY WITH FRACTURED ARM.

The collar of wood prevents animal tearing off bandage.

WILD ANIMALS IN DISEASE.

By W. REID BLAIR, D. V. S.

The care of wild animals in zoological parks is usually entrusted to "keepers" of the widest experience that can be obtained. These men, as a rule, are sympathetic and intelligent—two qualifications requisite for a man to become a successful keeper.

He who is most familiar with the appearance and deportment of a wild animal in health, at the various periods of its existence, will most readily appreciate all departures from the normal.

The careful study of different species of animals throughout their growth and development by one of good powers of observation, and a reflective habit of mind, is of great value.

The difficulty in arriving at a true diagnosis is greater in wild animals than in the domesticated species. Where docility is a pronounced factor, one arrives at a diagnosis by a process of elimination; by the use of the thermometer, the pulse, percussion and auscultation of chest cavity, and otherwise handling the patient without causing undue excitement.

The physical examination of a few of the smaller animals—especially the monkeys—is comparatively easy; but not so with one of the larger primates. An orang, baboon or large macaque may be so nervous or ferocious as to make a physical examination not only extremely difficult, but many times even impossible. Great care must be taken in handling all members of the order of Primates, as they are very sensitive creatures, of strong likes and dislikes, and very good memories. This I have observed on several occasions. One of them may be so treated that it would be almost impossible for the same person ever to succeed a

second time in examining him. However, if the subject has the good sense to realize that no harm is meant, he will usually quietly submit, according to his natural amiability.

Before making an examination of a patient, the "history" of the case is obtained from the keeper; and upon this much depends. To the experienced it means a great deal, and upon it, alone, a fairly safe diagnosis may often be made.

In many instances the disorder is readily apparent, and the exact location of it detected. Coughing, and rapid or difficult breathing point at once to the chest as the seat of the trouble. In many other cases, much greater difficulty is experienced. Patient watching, with a careful analysis and study of each individual case, however, usually dissipates all doubt.

When an animal is ill, it is, if practicable, removed from its fellows, whether its disease be contagious or not. In the former case the reason is obvious, but in all cases, quietness and extra comfort are needed. The patient can be better observed, the symptoms more closely noted, and the disease from which he suffers more clearly defined when it is alone, and left to the exercise of his own undisturbed will.

An important object in giving medicines to these animals is to concentrate drugs as much as possible. It is best that the animal should not know that it is getting medicine at all, so it becomes necessary to disguise the drug in some way.

Modern pharmacy has provided a large number of preparations for the practitioner of human medicine, which in some respects are far more necessary to him who ministers

to sick animals, which cannot understand the object of what must seem to them ill usage.

Again, there is every reason why they should get their medicine in the way that will cause the least disturbance of their feelings, and without that excitement which may follow a struggle to give medicine. Small pills, gelatin-coated, or sugar-coated, sweet lozenges, tablets or gelatin capsules, carefully concealed in an innocent-looking banana, may be administered to an unsuspecting ape, without the slightest trouble. Occasionally, however, he may suspect, and great is your dismay at seeing him minutely pull the banana apart, find the offending pill, test it with his teeth, smell of it, and finally, with a wry face, cast it through the bars of the cage at his keeper.

The nursing of sick animals is of the greatest importance. The essentials are pure air, sunlight, cleanliness and warmth, nourishing and sustaining diet. During convalescence, all kinds of food may be offered to tempt the appetite, first one thing and then another; but no food should be allowed to remain before the animal, because the very fact of its being constantly present will cause him to loathe it.

When an animal has no appetite, the stomach is not in a proper state to digest food—consequently, if forced upon him, it will cause indigestion and aggravate the case.

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GENERAL INFORMATION.

ADMISSION TO THE PARK.—On all holidays and on Sunday, Tuesday, Wednesday, Friday, and Saturday admission to the Zoological Park is free.

On every Monday and Thursday, save when either of these days falls on a holiday, only members of the Society, and persons holding tickets from the Society, are admitted free. All others pay twenty-five cents for each adult, and fifteen cents for each child under twelve years of age.

Tickets are sold only at the entrances.

Admission to the Aquarium is confined to members on Monday and Tuesday from 10 A.M. to 12 M. At all other times it is open to the public.

OPENING AND CLOSING.—From May 1st to November 1st the entrance-gates will be opened at 9 A.M. and closed half an hour before sunset. From November 1st to May 1st, the gates will open at 10 A.M.

Receipts must be checked at the entrances. Five cents. All wheels not called for half an hour before sunset will be locked up until the following day.

RESTAURANT.—At the Rocking Stone Restaurant meals are served à la carte every day from 10 A.M. to the closing hour. The North Pavilion of this building has a spacious lunch counter, where all kinds of luncheon food are served at popular prices.

The South Pavilion will be arranged as an open air dining-room. The service will be increased and improved, so that large numbers may be served expeditiously.



PHOTO BY E. R. SANBORN

YOUNG CHIMPANZEE, "POLLY."

NOTES.

A wild Great Blue Heron has been captured in the Ducks' Aviary. This specimen is one of a number which have been flying about the Park, and perching on the Flying Cage.

* * *

English Starlings are increasing in the Park at a rapid rate. Early in the morning they may be seen in great numbers perching on the fences in flocks which rival in size those of the English sparrow, and it is the opinion of Mr. Beebe that they will ultimately become as great a nuisance as that bird.

* * *

The Gray Squirrels which seemed so thoroughly at home last year in the Park, have almost disappeared from places where they were once fairly numerous. This is due to a general migration, and subsequent slaughter by the "pot hunters." Late in the fall of 1902 the squirrels crossed the Bronx River and were killed by vicious boys and men. Several persons were observed carrying bags of as many as ten squirrels, but unfortunately it was impossible to secure their arrest.

* * *

After long waiting, the Zoological Park has acquired—not a fossil *Mastodon giganteus*, but a fine, new, very-much-alive steam roller, which has been christened the Mastodon. Henceforth the walks in the Park shall be smooth, and agreeable to the feet of visitors. All new walks and corrals of macadam will receive a far better finish than we have heretofore been able to give them; for fifteen-ton rollers like ours have not been available, and ten-ton rollers are too heavy for our work. Our "Mastodon's" work is cut out for a long distance into the future.

* * *

The Society has added to its list of publications a beautiful booklet, entitled "Views in the New York Zoological Park," comprising scenes within

the Park, and many rare animal subjects. The book is five by seven inches, and contains twenty illustrations, reproduced by the albertype process, which gives the appearance of a soft platinum print. The sales have been very large, and apparently it was a step in the right direction. In addition to the Views, a series of picture Post Cards, of various subjects reproduced in same manner, also has been issued.

* * *

The greenhouse, which for three years has been known to the public as the Small Mammals' House, and served as a home for a miscellaneous collection of small cats, rodents, etc., has been removed to the Nursery. It will there serve its proper functions. On the ground it occupied, Geo. L. Walker & Co. will erect two buildings for small mammals and ostriches, which will closely adjoin. In the Small Mammals' House there will be 104 inside cages, all connecting with an equal number outside. The Ostrich House will contain 14 inclosures connecting with outside yards. Both buildings should be completed in the spring of 1904.

* * *

The new sections of the Bear Dens have been completed, and bears from the older portion have been moved into the new quarters. The empty dens are being cleaned, painted, and repaired. The entire series now comprises nine commodious inclosures, each with a bathing pool. The new dens contain some fine examples of rustic rock-work, and are decidedly creditable to the builders. The latest additions to the bear collection are two great Yezo bears, the specific identity of which is yet to be determined; a Merriam's bear from the Alaska Peninsula, collected by Mr. A. J. Stone; and a grizzly cub from Mexico, presented by Mr. Charles Sheldon.

* * *

With the first herd of American Prong-Horned Antelope, the Society established a free colony of Missouri Prairie Dogs. As a bit of local color, the colony was a success; as a nuisance, it achieved an equal reputation, developing into a pest which Mr. Merkel regarded with terror. Various expedients were tried to capture the members of the colony and restore them to the Prairie-Dog Village. But the little animals greatly enjoyed their freedom, and craftily eluded every artifice designed to deprive them of it. They roamed at will over the lawns, burrowing everywhere, even going, in their wanderings, as far as West Farms. A professional trapper was at length sought, and he employed an ingenious method, which ended in the complete confusion of the colony. A barrel, open at both ends, was placed over each burrow, and the entrance to the burrow filled with loose soil or sand. As soon as the inmates became tired of this imprisonment, they burrowed out, and the loose soil filled the hole after them. One by one they were plucked out of the barrels and placed in the Prairie-Dog Village, and within two weeks, the entire colony was transferred.

* * *

There have been many cases in zoological garden work, when a rough form of dentistry has been required. Thus far the Zoological Park has escaped this ordeal, which in a great many cases, especially with large cats, might prove most try-

ing. In the latter part of August, the tigress, "Rance," after an afternoon feeding, succeeded in fastening a large piece of bone to the left canine tooth, on the upper jaw. It became so firmly attached and was so great an annoyance that the animal was in grave danger of going into a fit. Several attempts were made to entice her to the cage front, so that a grip with tongs might be gotten on the bone. All were failures, as she absolutely refused to be coaxed. The situation became grave; something had to be done, and that quickly.

The Director decided that the only hope of handling the animal, was to confine her in the small shifting cage. This was quickly accomplished, and a rope thrown over her neck and one around the body. At first she resisted and struggled, but suddenly she seemed to realize that measures were about to be taken for her relief. Instantly she became perfectly submissive and permitted herself to be drawn close up to the side of the shifting cage. Through the wire mesh the Director quickly inserted a long pair of tongs and dislodged the bone, which was fully two inches in diameter. The tigress suffered not the slightest injury, and the whole operation, including the return of the animal to her cage, was accomplished within about twenty minutes' time. This incident serves to emphasize most clearly the great usefulness of the shifting car in the rear of the dens of the great cats. It is probable that nowhere else in the world could a full-grown tigress have been handled so quickly and easily as on this particular occasion.

RECENT ARRIVALS.

GIFTS.

Mammals.—Two White-faced Sapajous; 1 White-throated Sapajou; 1 Snow Leopard; 1 Grizzly Bear; 1 Opossum with 12 young; 3 Raccoons; 1 Albino Angora Cavy; 2 Belgian Hares; 1 Albino Rabbit; 4 Fox Squirrels; 4 Dancing Mice; 1 White-tailed Deer; 1 Buffalo; 10 Elk.

Birds.—Two Canaries; 1 Japanese Robin; 5 Mexican Screech Owls; 1 Western Great Horned Owl; 8 Sparrow Hawks; 1 Brown-winged Hawk; 2 Barred Doves; 2 Ring Doves; 1 White-fronted Amazon Parrot; 1 White Ibis; 25 Green Herons; 3 Whistling Swans; 1 pair Chinese Geese; 2 Egyptian Geese; 1 Black Skimmer; 50 Laughing Gulls; 1 Herring Gull; 4 Least Terns; 5 Common Terns; 1 Brown Gannet; 1 Gannet.

Reptiles.—Two Hawksbill Turtles; 12 Horned Toads; 1 Iguana; 1 Water Moccasin; 2 large Garter Snakes; 1 Yellow King Snake; 1 Milk Snake; 1 Green Snake; 1 Boa.

PURCHASES.

Mammals.—One Siamang Gibbon; 1 Tscheli Monkey; 2 Rhesus Monkeys; 1 Borneo Monkey; 2 Chinese Macaques; 1 Japanese Red-faced Monkey; 1 Golden Spider Monkey; 2 Black Saki Monkeys; 1 Owl Monkey; 1 Clouded Leopard; 1 Common Civet; 1 White-whiskered Palm Civet;



PHOTO BY E. R. SANBORN.

PORTION OF ELK HERD PRESENTED BY HON. WILLIAM C. WHITNEY.

1 Senegal Gennet; 2 Dingoes; 1 Merriam's Bear; 1 Mexican Grizzly Bear; 2 Great Yezo Bears; 2 American Prong-Horned Antelopes; 1 Mule Deer.

Birds.—Two Honey-Creepers; 1 English Blackbird; 2 White-Necked Ravens; 1 Barn Owl; 1 Prairie Hen; 1 pair European White Storks; 6 Wood Ibises; 8 White Ibises; 1 Great White Heron; 7 Great Blue Herons; 1 American Flamingo; 1 Java Tree Duck; 1 Brown-Headed Gull; 6 Florida Cormorants.

Reptiles.—Two Yellow-Bellied Terrapin; 1 Cumberland Terrapin; 1 Snapping Turtle; 1 Pyxis Tortoise; 2 South American Snaked-Necked Turtles; 2 European Tortoises; 12 Hieroglyphic Turtles; 3 Soft-shelled Turtles; 1 Cuban Crocodile; 1 Red-headed Lizard; 8 Green Lizards; 2 Australian Monitors; 1 Tegu Lizard; 6 African Chameleons; 2 Horned Vipers; 3 Leopard Snakes; 12 King Snakes; 2 Sand Vipers; 1 African Horned Viper; 2 European Vipers; 1 Bushmaster; 1 Spotted Coluber; 9 Crested Newts; 48 Common Newts; 12 California Newts; 6 Mud Puppies; 3 California Tritons.

New York, 950 Green Crabs. Joseph Vogel, Brooklyn, N. Y., 1 Snapping Turtle. Theo. Ulhorn, Brooklyn, N. Y., 2 Florida Alligators. The Tuxedo Club, Tuxedo, N. Y., 150 specimens of fishes, representing 9 species. Lambert O'Neill, South Beach, S. I., N. Y., 1 Sea Turtle. R. N. Eldredge & Co., New York, 1 Green Turtle. Fred. Vandoren, Hoboken, N. J., 2 Spotted Turtles. William Fajen, New York City, 1 Green Turtle. William Carmichael, Stapleton, S. I., 1 File Fish. C. E. Browne, Highland, N. Y., 3 Alligators. J. Burns, New York City, 1 Box Tortoise. Miss Emma Nichols, Brooklyn, 1 Painted Turtle.

BOOKS.

William H. Gregg, "When, where and how to catch fish on the East Coast of Florida." Joseph Kalbfus, Secretary State Board Game and Fish Commissioners, Pennsylvania, "Game and Fish Laws of Pennsylvania." Dr. R. W. Shufeldt, "Osteology of the Steganopodes." Henry Clay Weeks, "Extermination of the Mosquito."

GIFTS TO THE AQUARIUM.

SPECIMENS.

George C. Kirk, Syracuse, N. Y., 2 Mud Fish, 1 Snapping Turtle, 1 Bullhead. Lynch & Co.,

PURCHASES.

692 Bermuda fishes, representing 57 species; 1 Florida Manatee; 1 Thread-Fish.

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THE ANTELOPE HOUSE.

By ELWIN R. SANBORN.

Photographs by author.

THE completion of the new Antelope House, designed for tropical ruminants, especially antelopes, marks not only the constant and certain progress of the Zoological Park, but adds to the list of its animal buildings an imposing and important structure.

The building operations of the current year are thus pleasantly brought to a close, by the opening of this new installation, fully stocked with fine specimens.

Ever since the opening day of the Park, the temptation to secure some of the interesting



ELAND.

From the estates of the Duke of Bedford, Woburn Abbey.



MAIN HALL OF THE ANTELOPE HOUSE.

antelopes now becoming so rare, has been difficult to resist. But the futility of this desire—until suitable quarters could be provided—was so strongly exemplified by the perplexing task encountered in the care of the few tropical deer through the winter, that no other argument for its abandonment was necessary.

The new Antelope House stands on the highest point of ground in the Park; on the site of the Lodge of the old Lydig Homestead, at the southernmost boundary, midway between the Prong-Horned Antelope Range and the Buffalo Range. It commands a charming view of the Aquatic Mammals' Pond in one direction, and the flat meadows and Mountain Sheep Hill in the other; while directly north are the Reptile House and the new Small Mammal and Ostrich Houses now under construction. In fact, the widest general view of the Park is obtained from this point and on a bright spring morning it is a view long to be remembered. A grove of honey locusts, maples and elms yields a pleasant shade, so that at all seasons the corrals will be protected alike from the fierce summer sun and cold winds of winter;

and as the grounds slope gently in every direction, the heavy spring and autumn rains will flow off so rapidly as to leave no dampness behind.

GENERAL CHARACTER.

The building is of but one story, as are all the other Park buildings, and the materials used in its construction are buff-colored brick, gray granite, Indiana limestone and terra cotta.

Its general form is that of a huge ellipse. From each of the long sides radiate spacious fan-shaped enclosures, and so skilfully have these yards been planned that were the lines of the enclosures continued, they could all be joined at two points in the building's interior. The apex of each of these yards, with the point cut off, makes the interior quarters of each specimen. There are twenty-four of these stalls, and of this number four are 19x24 feet.

The entire length of the building is 142 feet and the width 78 feet. Including the yards and walks these figures increase to 387 feet by 335 feet. The yards are macadamized, and a concrete coping surmounted by a heavy wrought



WHITE BEARDED GNU.

iron fence 1,392 feet in length encloses the entire area. The macadam and concrete work was performed by the Park force, aided by the new steam roller "Mastodon."

The yards are admirable, both as to solidity of construction and general arrangement.

The fence of heavy $\frac{3}{4}$ -inch wrought iron bars, and the concrete coping under it are of the most permanent character; and the double partitions of springy steel wire, while not so bold in outline, are strong enough to resist the stoutest attack of the inmates.

Between the corrals are paths three feet wide, giving access to the keepers and absolutely preventing the longest horned antelope in existence from prodding his neighbor. If perchance the animal accomplishes the feat of breaking through the wires he will still find himself a prisoner; also a most important advantage. The plain outline of the outer enclosure is broken by decorative gateways at each division. Each corral is provided with sewer connection and a macadam bottom as hard as good material and workmanship could devise.

A twelve-foot walk bounds the extreme cir-

cumference, and leads easily to the entrances. In the pediments over each doorway are eland heads, carved in limestone, after a model by Mr. A. P. Proctor. Aside from this, the scheme of decoration is of the simplest character.

THE INTERIOR.

The interior comprises one large hall rising in the centre to the monitor roof, supported around the sides by iron pillars. A flood of light entering the large sky-lights of cathedral glass and also a belt of windows encircling the highest part of the hall diffuses itself sufficiently through the stalls, so as to afford an easy inspection of the specimens and yet not disturb the vision. The white and gray expanse of plaster in the highest parts of the dome is divided into simple panels, the centre one bearing the seal of the Society, done in the same material.

The large stalls are separated one from the other by heavy brick partitions, sufficiently high to prevent the occupants from getting a glimpse of each other (excepting the giraffes,



PAIR OF GIRAFFES.

The male is nearly 12 feet in height.



THE ADDAX.

which gaze over the top with ease) without preventing a complete circulation of air. The smaller stalls are divided by sheet steel surmounted by bars. The walls are tinted a cool, grayish green. This seems the best color. The floors of the stalls are cement, sloping gradually to the catch basins. Each stall is provided with a porcelain bowl for food and another for water, so that sanitary conditions at all times can be maintained in a most satisfactory manner. The temperature can be regulated with the greatest accuracy; the system of hot-water heating being regulated by mechanical means. The stall-fronts are a radical departure from the chain-netting used so extensively in the other buildings, inasmuch as iron bars have been used. Of these stalls eight are 12x16, twelve are 10x16, and four are 19x24 feet. These large enclosures have been equipped with iron-front structure, capable of resisting the great strength of an elephant, rhinoceros or hippopotamus. Specimens of these

animals, when it is possible to get them, will be housed here until the Elephant House is built.

THE COLLECTION.

The Antelope House was opened to the public, with every stall occupied, the Society subscribing the value of the entire list of specimens, amounting in round figures to \$15,000.

Two of the large stalls are now occupied by an immense bull eland, and a pair of the finest giraffes which could be purchased. The eland stands fully six feet at the withers, and weighs about two thousand pounds. He is a fine, healthy animal, carrying a superb pair of horns about two and one-half feet in length, which with his long dewlap give him an imposing appearance.

The Society was fortunate in securing so fine a specimen of the largest of the bovine antelopes. Once very abundant in the dry plains of South Africa, it is now extinct in Cape Colony, Natal,

the Orange Free State, the Transvaal, and almost exterminated in all the countries to the west of the land of the Matabele, watered by the river Limpopo. At one locality in Natal it still exists and is carefully preserved. Like our native bison, it bids fair to be seen only in zoological parks and gardens. This specimen has been named "Duke," in honor of the Duke of Bedford, from whose park at Woburn Abbey he was secured by Mr. Hagenbeck.

The Society left no means untried to obtain a pair of giraffes. After several attempts, Mr. Hagenbeck secured a pair nearly eleven feet high, which were bought for \$5,500.

The Gnu, called by the Cape Dutch *Wildebeeste*, unites a decidedly ugly and grotesque appearance with an irascible temper. It is not responsive to kind treatment; and the ox-like head, surmounted by heavy sharp horns, embellished with all manner of bristling mustaches, bushy mane and beard, set closely to the horse-like body, gives it more the appearance of the fabled unicorn than an antelope. Two pairs of White-Tailed and White-Bearded Gnu are shown.

In decided contrast to the Gnu, is the graceful Addax Antelope, with long, spiral horns; the Isabelline Antelope, the Blessbok, with the curious white blaze down the head, giving rise to the name *Blazebuck*; and the beautiful *Beatrix* Antelope from the Arabian Desert. One striking feature of these desert antelopes is the broad, flat hoof, resembling that of the caribou. The largest antelope of India is the species known as the Nilgai. A remarkable peculiarity is the color, which, in the male is a dull blue, while the female is so light that she would surely be suspected of not belonging to the same species.

The remainder of the collection comprises: 4 *Cervicapra* Antelopes, or Blackbuck, from India; 1 Baker's Roan Antelope; 1 Sing-Sing Water-

buck; 2 *Redunca* Antelopes; 1 *Duiker* Antelope, and 2 Dorcas Gazelles.

At present, the Steller's Sea Lion and two African Ostriches have been placed here until quarters elsewhere can be arranged, and the Zebras and two Equine Deer also will have quarters in this building.

CONTRACTS AND PLANS.

The total cost of the Antelope House installation has been approximately \$55,000. The Page Woven Wire Fence Company has erected the iron and wire work of the outdoor enclosures; while the main structure has been erected by Thomas Dwyer.

The Society's architects, Messrs. Heins & La Farge, executed the plans for the architectural work, based upon the ideas and ground plans of the Director, who made exhaustive studies abroad for this purpose. The plans for the yards, their iron and wire work, and the walls surrounding them, were prepared by the Society's Civil Engineer, in which many difficult problems have been admirably worked out.

The contractors began work August 1st, 1902, and the building was opened to the public November 12th, 1903.

Acknowledgment is due from the Society to Mr. Martin Schenck, Chief Engineer of the Park Department of the Bronx, for the continuous supervision he has devoted to this building. The cost of construction was defrayed by the City of New York, and the entire collection was purchased by the New York Zoological Society. Like the other buildings at the Park erected by the Society the Antelope House and yards are characterized by simplicity of design and solidity of structure.

POISONOUS SERPENTS OF THE OLD WORLD.

By RAYMOND L. DITMARS,

CURATOR OF REPTILES.

WITH the Old World poisonous snakes the Reptile House is well represented. The most interesting of these specimens is the King Cobra, now an inmate of the Park for over two years. This splendid reptile is at least ten feet long, and in prime condition. Strictly cannibalistic, the specimen is provided with at least one snake of over four feet, each week, the same being first killed, then stuffed with frogs or small rats to make it more substantial.

Though capable of spreading a "hood," this large reptile does not stand so high from the

ground, or spread so wide in proportion to its size, as the Cobra-de-Capello, nor does it maintain the position for so great a time as the latter species.

The Hooded Cobras, represented by four specimens of two varieties, are the stars of the Reptile collection, and the most vicious snakes that have ever come to the Park. These reptiles will remain for a half hour or more in an upright position if they are annoyed, and upon discovering that they have failed to vent their anger upon the object of their annoyance, will fight fiendishly



PHOTO]

[E. R. SANBORN

HORNED VIPER.

among themselves. Fortunately, they are immune to each other's venom, so these combats terminate with little damage on either side. The specimens from Calcutta, presented by Thomas Barbour, Esq., are typical in their markings, and show on the "hood" when the same is expanded the staring aspect of two large eyes enclosed in spectacles, which peculiar ornamentation has led to the popular appellation of "Spectacled Cobra." Two specimens from Sumatra show the variability of the markings on the "hood." These are varieties of the typical Indian form, and technically known as *Naja tripudians semifasciata*. Popularly, this form of the hooded snake has been called the Masked Cobra, from the appearance of the pattern on the "hood," which resembles a grotesque mask.

When annoyed, the Cobra literally flies into an upright position, the neck dilating in time to the movement. The action is accompanied by a sharp hiss, and if a moving object be within reasonable distance, the snake strikes immediately. The entire series of evolutions are almost synchronous at times. We have never observed these snakes to strike without first rising from the ground, or with the neck spread widely. In a wild state, their only warning would be a sharp hiss, which usually accompanies the instant of preparation, but so slight is this that unless he who seeks to evade the blow be possessed of lightning-like agility, the damage is done before he has time to realize what has happened.

Among the Old World poisonous snakes, the vipers figure prominently. Six vipers are on exhibition. These comprise three species, the smallest of which is the English Viper, a snake of pretty pattern and gentle aspect, and the only venomous reptile inhabiting the British Isles. It is found, as well, throughout Europe. In some

ways this little serpent resembles the Ground Rattlesnake of the Southern United States.

Three Horned Vipers are oddities of the collection. Queer in color and provided with a long horn on the snout, their appearance would suggest a hostile nature, which is anything but the case.

One of the recent arrivals is an African Sand Viper, brick red in color, thick in body, and with a heart shaped head that at once suggest its deadliness. Remarkable in many ways is the new arrival. It never crawls forward in undulating fashion, as do other snakes, but travels in a series of bewildering side loops. It prefers to lie buried in the fine sand of its cage, with the exception of its snub nose and fiery red eyes. To bury itself thus, it scoops the sand over its body by flattening the latter, by means of a shovel-like movement of its sides. Thus it remains in wait for food, its colors blending with the fine sand in which the creature lies.

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Elwin R. Sanborn, - Asst. Editor.

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THE AUTOMATIC SHOT-GUN.

A new engine of great destructive power has appeared in the field to aid the forces at work in the extermination of our game. This time it is the birds that are to suffer.

A shot-gun which fires, ejects the dead shell and reloads in response to one pull of the trigger has been placed on the market. With it the skilful market hunter or sportsman can wipe out an entire covey in the same number of seconds that are now required for the discharge of the "right and left."

Although the game birds and animals of this continent have diminished at an alarming rate, the number of shooters and the efficiency of their firearms have increased even more rapidly. The first hunters who followed the wild turkeys

in New England on the first Thanksgiving in America carried a blunderbuss scarcely more effective than the bow and arrow of their Indian rivals. In fact, as against game, the latter may have been more deadly, as the noise was certainly less and the range nearly the same. Then followed two centuries of matchlock, flintlock and cap, all of them slow and uncertain. With the introduction of the rifle, essentially an American production, came a rapidly increasing range and accuracy of aim; but the loading was still very slow. Then a half century ago, just as the game entered on the stage of final decline, we find the breech-loading rifles and double-barrelled shot guns appearing.

Next in the shot-guns came improvements in cartridges and ammunition, and in breech-mechanism, culminating in hammerless and magazine shot-guns.

With the automatic shot-gun the series has culminated. In the same period rifles have improved even more rapidly, until now the tyro hunting in the Adirondacks or Maine, with a solid-nosed bullet and a rifle carrying a mile, not infrequently kills his fellow man, when the latter is quite beyond his vision. In fact, the time is in sight when the State must require a license for carrying rifles, or prohibit their use entirely.

The shot-gun, however, will flourish long after the rifle has been prohibited, just as there will be food for shot long after victims for bullets are gone.

It will be difficult to prevent by law the use of these new automatic shot-guns, although swivels and large bore shot-guns have been interdicted in duck shooting, and pitfalls and snares barred in the chase of large game. A public sentiment can be aroused, and decent sportsmen can declare against the use of these new weapons; but only the law can reach the pot-hunters, or the sportsmen who are not decent.

There is a crumb of comfort, however, in the fact that all these deadly devices in firearms

bring rapidly closer the day when this state and all the states will prohibit the use of lethal weapons, exactly as carrying of pistols, common throughout the country fifty years since, has been stopped with the entire approval of the public.

In less than a generation the day will have passed when the American can wander at large over the landscape slaying all living things at will. Then perhaps some remnant of our game may be allowed to live in peace.

WILD-ANIMAL PHOTOGRAPHY.

Perhaps in no branch of photography are the limitations of the camera more frequently in evidence than in the taking of wild animals. It is easy to make a picture; but to secure a *good* picture is very difficult, and to obtain one that is perfect is an achievement. Of animal photographs, many are called, but few are chosen.

Thus far over one thousand negatives of animals have been made in the Zoological Park, under the best conditions that could be secured. If this experience is of any value, then the following things are true:

No photographer can obtain good pictures by making exposures from the walks, or between the bars of enclosures.

Good photographs of animals can be secured only by going into their enclosures, or by building a place in which to make exposures through an aperture.

It is dangerous for a photographer to enter the enclosures of wild animals, even when attended by a keeper to control the beasts, or hold them at bay.

As an illustration of the truth of the last proposition, take the case of the Zoological Society's photographer and the llama,

A llama is a camel-like animal, *sans* horns, hoofs and tusks. One would as naturally look for danger from a rabbit; and when Mr. Sanborn entered the Llamas' Corral, he took the keeper

in charge as a helper in herding the animals, not as a protector.

After the desired number of exposures had been made, the two men turned to leave the enclosure. While both had their backs to the animals, and the keeper was unlatching the gate, Mr. Sanborn heard behind him the sound of crunching gravel, and turned to ascertain the cause. The largest of the llamas, now known to be a most ill-tempered and savage beast, was in the act of springing upon him; which it did, with great violence. Before he could lift a hand, Mr. Sanborn was dashed to the ground, and the beast fell upon him. His camera box was driven against his face, and some sharp portion of it cut his upper lip in two as completely as if it had been done with a knife. Besides this, he sustained other injuries. Although the keeper rushed to his rescue and beat the llama until it fled, the mischief had been done.

The Society's excellent photographs of bears, wolves, elk, deer, buffaloes and in fact all other animals save the large felidae have been obtained by going in with the wild beasts. Despite the presence of keepers, Mr. Sanborn has been obliged to fly several times before his subjects; and in times of danger he has been directed to save himself first, and his camera afterward.

There is no royal road to success in photographing wild animals. About this work there is nothing easy or simple. Good pictures are hard to win, and poor pictures are worse than none, for they repel interest instead of attracting it.

The fees for membership in the New York Zoological Society are as follows:

Annual membership	\$ 10.00
Life membership	200.00
Patron's fee	1,000.00
Founder's fee	5,000.00
Benefactor's fee	25,000.00

Information and blank forms for membership, may be obtained at the Service Building, at all entrances to the Zoological Park, and at the Secretary's Office, No. 11 Wall Street, New York City.



HOW THE PICTURES WERE TAKEN.

THE HOME OF THE BROWN PELICAN.

By C. WILLIAM BEEBE.

CURATOR OF BIRDS.

Illustrations from photographs by author.

CRATES of brown pelicans have arrived at the Zoological Park year after year, until a good-sized flock of these birds, old and young, now sail about the flying cage or swim on the pools.

Their scientific name is *Pelicanus fuscus*, so at least one bird enjoys the same appellation, whether discussed by layman or man of science. From his appearance in general, it would be a difficult matter to say where a pelican belonged in the great class of birds, but his four toes, all pointing forward and joined together with a single web, is his family distinction, and shows his kinship with tropic-bird and cormorant, snake-bird and gannet.

But these facts we can discover in any museum, and although we can learn much about him by watching his contented life in our big Zoological Park, it is his wild home life with which we are now concerned.

On the twenty-fifth of February of the present year we started from Oak Lodge, on the east coast of Florida, for a ten-mile sail down the Indian River to Pelican Island. The sun is warm and though we drift but slowly with the light breeze, we find every moment full of interest. From the mangrove shadows near shore, great blue, little blue and Louisiana herons rise

continually, the former silent, the two latter with complaining cries. A dainty Louisiana heron. "the lady of the waters," is a charming sight when in full flight, so full of grace is every motion.

The screams of ospreys sound overhead, while from the palmettos come the 'q! q! q!' of cardinals and the beautiful strain of yellow-throated warblers. High over all, the black vultures poise motionless or swing round in great circles. And when the breeze freshens and brings the sweet scent of orange blossoms from the groves of Micco, we feel that Nature has left nothing lacking—sound, sight, odor—all the senses are gratified.

Not only the land and air, but the water around us seems full of life. Hundreds of mullet leap far out of the water, flash like silver for a moment and then drop back with a splash. Sea-trout also jump into the air, but their clean-cut dive leaves no bubbles, makes no splash. Needlefish glide from our path like ghostly shadows, and whenever any unusual commotion occurs we strain our eyes eagerly, hoping by good fortune to catch a glimpse of a manatee.

Perhaps the most remarkable sights on the way to Pelican Island are the flocks of wild ducks. Now and then our sail-boat approaches

an immense mass of these birds, which gradually divides into two portions and we find ourselves almost surrounded by a living barrier of ducks—hundreds upon hundreds of blue-bills. They mass closer and closer as we approach, when suddenly those nearest us begin to beat the water with their wings and feet, and instantly, with a great splashing and roar of wings, the entire flock rises, settling again a half-mile or more away. Here in this shallow inlet these birds find abundant feeding grounds, and here they spend the winter and early spring, until the time comes for them to scatter to their breeding grounds in the far north.

The first hint that we are nearing our destination comes from high in the air, where a maze

is the famous breeding place of the brown pelicans. The history of the origin, rise, development and fall of a nation or people is far more interesting than the sporadic accounts of unconnected epochs, and here, what a story might be told of the founding and growth of this colony of birds, of its struggles against dangers, elemental, human and otherwise! We know nothing of where the first birds came from, only that the colony was flourishing at least thirty years ago. How much longer it has existed, no one knows.

This irregular islet was formerly wooded with live oak and mangrove, but now there are but a few stumps standing, dead and half rotten, their whitened limbs sprawling upward as if clutching



THE GROUND IS HIDDEN BY CROWDS OF BIRDS.

of birds circle about each other, buzzard-like. The glass shows these to be brown pelicans. As we watch we see others rise apparently from the river and join in this aerial maneuver, while now and then a number of birds detach themselves from the main body, fall into line one behind the other and start toward the ocean, passing out of sight behind the dark line of palms and live oaks, which marks the peninsula. At our approach the cloud of birds circles lower and lower and soon disappears altogether.

Pelican Island itself is very inconspicuous, and not until we are close to it do we realize that this low islet of perhaps three acres extent

at the air for support as they tremble under the clumsy alighting of the pelicans. There are scores of islands no different from this, scattered up and down the Indian River, and yet the pelicans when they had once selected this as a nesting site, could not be driven away, although plume hunters shot them by the hundred, sometimes reducing their numbers to a scanty remnant. The weight of their nests gradually levelled all the trees, so that of late years the birds have had to bring much of their nesting material from the main shore, over half a mile away, and build their flimsy nests on the low ground. This change in habits, while it showed



THE NESTS ARE ROUGH STRUCTURES OF REEDS, STICKS
AND RUBBISH.

most forcibly the strange attachment which this spot possessed for the birds, was fraught with new dangers, as when in 1885, and doubtless in other years, high tides overflowed the island and washed away eggs by the hundred. Still the brave pelicans stick to their island, and as we shall see, their perseverance has at last received its reward.

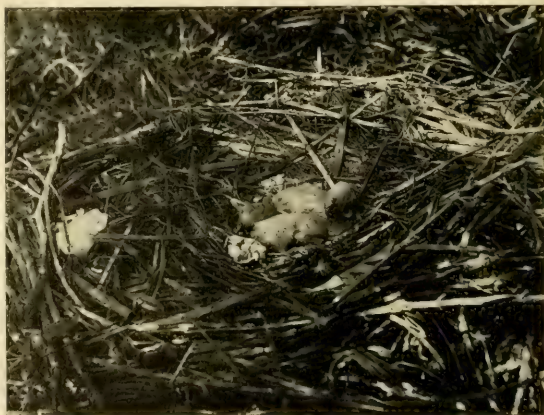
We find it to be a pelican island indeed, for excepting a grass-covered marshy area, the ground is hidden beneath a vast crowd of birds, all watching us as our boat draws near, heads held high and huge beaks pointing downward — pelican-fashion.

Wading ashore, every step sends up a fresh cloud of birds, their long pinions making a noise as of a great wind; now reflecting the sunlight from their silvery backs and wings, now showing almost black against the sky as the dark chocolate breasts are turned toward us. The pelicans are remarkably fearless and remain on their nests until we are within fifty feet. As we walk through the heart of the colony we are the centre of a circular area about a hundred feet in diameter, free of adult birds.

The nests covering the ground are two or three feet apart, and are rough structures,

piles of sticks, reeds, dried grass and rubbish, with now and then portions of bleached fish and pelican skeletons. The nesting period must extend over a considerable time, as we find fresh eggs, others ready to hatch, and young in all stages of growth. There are scores upon scores of eggs, rough and chalky in appearance and measuring two by three inches. Three is the usual number in a nest, although in many there are one, two and four, and in several as many as five. Dozens of eggs lie strewn about, some in the water, some which have just rolled from the nests.

Two seems the almost invariable number of young which are hatched in any one nest. We find that it is better not to remain long in one spot as the recently hatched young birds suffer from the heat. When we move ahead some distance, the old birds promptly return, either to squat down and brood the eggs, or, if these have just hatched, to stand upright on the sunny side of the nest so that a cool shadow falls across the young birds. We assist one youngster out of his shell and within four minutes one of his parents returns and gazes at her offspring with interest, nay, let us say, with sincere maternal solicitude. We almost wonder that the sight does not arouse feelings of disgust or at least dismay, but faith must indeed be strong in a pelican's breast to



TWO SEEM THE NUMBER INVARIABLY HATCHED.



PELICANS ABOUT SIX DAYS OLD.

give assurance, that by the providing of many and frequent repasts of fish, anything in appearance like herself can be evolved from that object in the nest before her. Naked, blind and prostrate, it seems impossible that this amorphous, flesh-coloured squirming organism can be aught but some hideous monstrosity of nature—some changeling of the evil vulture spirits hovering ever near.

But let us look into this neighboring nest where are two little pelicans which have been out in the world for five or six days. As we approach, they make a brave effort to lift themselves and face us, but they totter with weakness and their tiny heads waggle ridiculously. They have true pelican grit however, and open their beaks, soft as they yet are, utter a spasmodic whisper of a hiss, and—collapse in a heap. Thousands of feather pimples cover their necks and bodies, which in a few days will burst and they will be completely covered with a soft white down. At this stage of growth young pelicans lose all their ugliness and soon become strong enough to descend from their natal pile of sticks and wander around at will. We find that those of the same age enjoy each others society and, although here and there a pelican in the downy dress is occupying a nest, the majority from now on spend

their life in wandering about, ten or twenty together. These are absolutely fearless and when we approach, they make a ferocious show of attack, lunging at us and snapping their beaks viciously.

One very interesting fact is that these birds can make a vigorous outcry, while all adult pelicans are absolutely without voice, a snake-like hiss being the only sound in their power. The young birds utter an odd cry: at a distance it sounds like the shrill laughter of young children. We wonder if the realization of this change to a voiceless condition ever comes to the young birds. They gabble incessantly, setting up a chorus at the approach of food or foe indifferently. It certainly is a means of communication, and the thought occurs to us whether the old birds do not

sometimes listen to them longingly, and wish for another chance to "have their say." A splendid opportunity for whoever wishes to draw a moral.

After the young pelicans have fully acquired their plumage or down, their appearance remains unchanged for some time, except that they increase quite rapidly in size. Soon the feathers of the wings begin to sprout, and before long the wings and a little patch on each shoulder are covered with good sized brown feathers. We notice three distinct grades, those in the downy stage, others in a condition of half-moult, and



OPEN THEIR BEAKS AND HISS SOFTLY.



PATCHES OF BROWN FEATHERS SOON APPEAR ON WINGS
AND SHOULDERS.

some fully feathered ones, which are only waiting for the growth of their primaries and secondaries to join their parents. Each of these are segregated in flocks by themselves. During the whole time the young pelicans remain on the island, and until they are able to fly, they use their angular, arm-like wings as balancing organs, waving them about as a tight-rope walker does his pole.

There are two or three small rain pools on the island and to escape us the young pelicans always make for one of these. A flock of forty immaculate youngsters standing in the center of one of these puddles, confident that the inch or two of water will completely prevent any further intrusion on our part, is an amusing sight.

Pelicans of this tender age are afraid of deeper water and rather than go beyond their depth at the edge of the island, they choose to turn and face us.

During the whole time that we are on the island, a ring of birds surrounds it about thirty yards from shore, all facing us, some continually leaving the circle and flying to their nests, others flying up before us and settling on the water. These watchful guardians evidently correspond to the cloud of birds which a short time before were soaring about in the air.

After taking photographs of eggs and young, I turn my attention to the old birds, and find no trouble whatever in getting them to approach the camera. I focus on a group of nests five or six feet away, and attach a long thread to the

shutter. Walking back some seventy-five feet I make myself as much like a prostrate inanimate log as possible, and watch my particular group of nests through the glasses. Soon the birds begin to return, nearer and nearer they come, waddling back and forth, sawing sideways swaths through the air with head and neck, and venting suspicious hisses upon the camera. But in a short time they accept it as a harmless new feature in the landscape, and settle themselves comfortably on their respective rubbish piles, perhaps within three or four feet of the lens. I now gradually draw the thread taut until I know the picture is taken. After taking three photographs in succession of one group of birds, I find the intervals of waiting have been fifteen minutes, eleven minutes and *three* minutes, showing how soon the birds acquire confidence.

But all the exposures are not made so unintrusively. Baby pelicans have the bump of curiosity largely developed, and often long before their elders begin to swoop down near the camera, these youngsters appear on the scene, balancing their tipsy waddling with frantically waved wings. Occasionally they pass between me and the camera and thus coming into contact with the thread, I find I have an excellent instantaneous photograph of empty nests taken for me!

What impresses us most as we watch the colony, is the excellent order which the birds preserve among themselves. Any individual out of place is forcibly reminded of it by pecks and nudges until she reaches her own nest. One bird, presumably the female, occupies the nest, while her mate stands on guard close by and keeps other birds from trespassing. Young birds are made to feel that they are distinctly out of place among the occupied nests, and when caught there they have to run a gauntlet of cavernous maws until they reach their fellows in the more open places.

We estimate the number of pelicans on the island at about two thousand, and it is probable that fully one-third of the colony are away fishing. Scores arrive every few minutes, and long lines start off now and then toward the ocean. Some of those arriving have sticks in their beaks, which they add to their nests. Once or twice—perhaps in their excitement at seeing us—the stick is dropped before the bird



THE FEMALE OCCUPIES THE NEST, THE MALE ON GUARD.

alights, and it is apparent that according to pelican law, it then becomes anyone's property, and great is the excitement aroused over it. More than once I observe a brooding pelican reach out and slyly abstract a stick or piece of reed from a neighbor's nest, and tuck it beneath her.

The majority of the new arrivals have their pouches filled with fish. It has been argued that a pelican cannot fly with fish in its pouch, but here we see birds settling down with unmistakable bulges in their pouches.

There is not the slightest doubt in my mind that each bird knows its own offspring, although to our uninitiated eyes there seems not the slightest distinction between the scores of youngsters about us. A pelican alights near a flock of young birds far from any nest and several waddle toward her with all speed, but she rebuffs all but one or two, over which she sighs in inimitable pelican fashion and coddles them beside her.

Although we had been warned about the unpleasant fishy odour, we find it scarcely noticeable.

A number of half-grown birds have been killed by the recent unusually cold weather, and on the highest stump on the island a somber vulture keeps watch while we remain — Nature's

board of health, waiting patiently for our departure.

Other birds besides pelicans are on the island, hangers-on of the community. Red-winged blackbirds, nesting among the reeds in the marsh, fly about or alight undisturbed in the very midst of the pelicans. Sanderlings and least sandpipers speed along the edge of the water, sending the myriads of fiddler crabs scrambling to their holes, and feasting on the flies which collect about the refuse pieces of fish. The white forms of three American egrets pass overhead, and with them our avifauna of Pelican Island is complete.

For some reason the pelicans do not seek their food near their island home, although there is no lack of fish in the waters of Indian River. We notice but one old bird diving near the island. They prefer to go up and down the coast, and generally fish in the waters of the ocean itself. If we encounter birds of this species forty miles to the north we may be sure that their home is upon this island. Half-way down the Florida Keys, I noticed several individuals which probably belonged to some

small colony in that locality.

It is with the greatest reluctance that we shove off our boat and start on our return, and as the mass of yellow and white heads grows indistinct and the last chatter of young pelicans is lost in the distance, we try to imagine the history of the colony during the coming months. The young birds learn to fly, join in the fishing excursions and soon become masters of their art. The last few youngsters are impatiently crammed with fish day after day by their parents, and as the summer's heat increases fewer and fewer birds return at night to the island, until the last weakening has flown, and a great silence succeeds the noise and confusion. A hungry vulture picks the last bone and the island is deserted. The nests become levelled, the grass grows rank and tall, and until fall, Pelican Island is the haunt of only heron and ibis.

When the pelicans leave their island, they do not scatter irregularly along the coast, but fly forty or fifty miles to the north, where fish are always abundant on the Cape Carnarval shoals. Here hundreds of these birds may be seen, resting, fishing, flying, until November, when they all leave for the southward. Exactly where they go we do not know.

The tribulations of the brown pelican, at least on the east coast of Florida, are past. Thanks



A STORM ARISING BRINGS THE PELICANS TO THE NESTS.

to the Audubon Society, his feathers are allowed to remain on his body and no longer deface the creations of the milliners. At the time of our visit, warning notices were posted on the island, and a special warden watched us from a distance, until assured that our guns were mounted on tripods and that our ammunition was plate-holders. Since that time, the United States Government has taken possession of the island and the future of the birds is assured.

The birds have so increased in numbers that several overflow colonies have been formed on the nearest land, the nests in these cases being placed in trees. One needs only to spend a day or two on the ocean beach of Florida to realize what a prominent feature in the landscape these birds form. One may lie on the warm sand and watch flock after flock pass close overhead—twenty, forty, even eighty birds—long undulating lines, now sailing with set wings, now beating the air in unison, and again gliding all

together. The marvel of their graceful flight is this alternate gliding and flapping—simultaneous throughout the whole flock.

One hour's count near Oak Lodge, of those passing south toward their island amounts to nine hundred birds, while apparently as many more are flying northward. Not only does this passing and repassing go on from daylight to dusk, but if we walk along the beach on a moonlight night, we will occasionally be startled by the rustling of wings and the shadows of ghostly forms soaring overhead.

A single glance at the comfortable group in their aviary in the Zoological Park brings to mind the whole varied panorama of their wild life, and as we watch one old fellow on his nest of sticks in the flying cage, we feel a peculiar sympathy with him, for cannot we too share his dreams of that wonderful little island where he first broke through his chalky shell?

GENERAL INFORMATION.

ADMISSION TO THE PARK.—On all holidays and on Sunday, Tuesday, Wednesday, Friday, and Saturday admission to the Zoological Park is free.

On every Monday and Thursday, save when either of these days falls on a holiday, only members of the Society, and persons holding tickets from the Society, are admitted free. All others pay twenty-five cents for each adult, and fifteen cents for each child under twelve years of age. Tickets are sold only at the entrances.

Admission to the Aquarium is confined to members on Monday and Thursday from 10 A. M. to 12 M. At all other times it is open to the public.

OPENING AND CLOSING.—From May 1st to November 1st the en-

trance-gates will be opened at 6 A. M. and closed half an hour before sunset. From November 1st to May 1st, the gates will open at 10 A. M.

BICYCLES must be checked at the entrances (five cents). All wheels not called for half an hour before sunset will be locked up until the following day.

RESTAURANT.—At the Rocking Stone Restaurant meals are served a la carte every day from 10 A. M. to the closing hour. The North Pavilion of this building has a spacious lunch counter, where all kinds of luncheon food are served at popular prices.

The South Pavilion will be arranged as an open air dining-room. The service will be increased and improved, so that large numbers may be served expeditiously.

ZOOLOGICAL SOCIETY BULLETIN

No. 13.

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April, 1904

THE PROGRESS OF THE IMPROVEMENTS AT THE AQUARIUM.

THE Zoological Society during the first year of its management of the Aquarium succeeded in effecting a number of changes in the interior of the building which have resulted in a very decided improvement.

and although this improvement work is yet in progress, certain very desirable features of it are accomplished facts.

Instead of now being a decidedly dark and rather dingy place the exhibition hall is



PHOTOGRAPH

VIEW IN THE MAIN HALL, NEW YORK AQUARIUM.

Showing the effect of increased lighting, new iron work in the balcony railing, and the position of the transparent labels above the main floor wall tanks

A



PHOTOGRAPH

E. R. SANBORN

FRESH AND SALT-WATER BALANCED AQUARIA, NEW YORK AQUARIUM

Used daily by teachers in the public schools, who bring their classes here or study

abundantly lighted and admirably painted. Forty-two skylights have been trebled in size, admitting light to all exhibition tanks and floor pools. The hitherto unpainted and soiled walls and pillars are colored in pleasing tones, and the large bare dome has been richly gilded, producing altogether a most satisfactory result. The opinions expressed by those who have commented on the changes produced have been highly commendatory.

A large amount of work has been completed, affecting the equipment of the building. Such alterations being located entirely behind the scenes, will not be appreciated by the general public, until their effect is noticed in the im-

provement of the exhibits which will follow.

The attention of members of the Society is directed, however, to some of the changes which can be seen at present. Primarily they are: Increased light, decoration of the walls, decoration of the exhibition tanks with rock work, introduction of transparent labels, better ventilation, elimination of unsightly features of construction, equipping the employees with neat uniforms, etc. The forthcoming annual report gives a minute description of the various improvements, and members visiting the Aquarium may inspect both the main hall and other changes in the rear of the exhibition tanks.

LIVE FROGS FROM THE CROP OF A LOON.

On February 18th, 1904, Dr. T. M. Hills, of Willimantic, Conn., sent to the Aquarium three interesting specimens of the leopard frog, which were taken from the crop of a loon, killed on the Willimantic River by Mr. M. Laramie.

The frogs were not discovered until after the taxidermist had skinned the loon. They were still torpid, and the loon undoubtedly got them out of the mud, in which they were hibernating. The frogs have been feeding freely for over a month, and appear to be in good condition.



PHOTOGRAPHS

HAWKSBILL TURTLE.

E. R. SANBORN

Showing the formation of the upper and lower shell

THE COLLECTION OF SEA-TURTLES.

ONE of the floor pools at the Aquarium is devoted entirely to marine turtles, and the few species obtainable along the north Atlantic coast are nearly always on exhibition.

The largest of all sea-turtles, the leatherback (*Dermochelys coriacea*) is not on exhibition, but will doubtless be secured during the coming summer, as it is occasionally taken in the large pound nets off the New Jersey coast. A very large specimen, weighing about 1,000 pounds, was captured at Cape May during the past summer. Steps were being taken to secure it for the Aquarium, when the animal died, apparently on account of rough treatment at the hands of the fishermen.

The Aquarium has two specimens of the loggerhead (*Thalassochelys caretta*), a species said to reach a weight of over 1,500 pounds. One of them weighing 250 pounds has been in the Aquarium four years, the other, weighing 270 pounds, has been in the building for one and a half years. The upper shell in both specimens is three feet long.

There are several specimens of the Atlantic green turtle (*Chelonia mydas*), most of which are of small size.

A single individual of the Pacific green turtle (*Chelonia virgata*), taken off the north coast of New Guinea, has been in the Aquarium for seven years, during this time it has grown considerably. When received, its upper shell or carapace was one foot long. At the present time its length is 1 foot 10 inches and its weight 50 pounds.

The hawksbill turtle (*Eretmochelys imbricata*), yielding the valuable tortoise shell, is not readily obtainable, but specimens have been kept here for two or three years at a time.

The hawksbill and green turtles live together amicably, while the loggerheads are constant fighters and require to be penned separately. Their huge jaws are capable of inflicting serious injuries on each other.

The Pacific green turtle, which was brought in by the ship "Manuel Laguna," is named "Manuel." It was kept for a time in the laboratory and became very tame, crawling across the floor when called at feeding time.

The food of all of these species in captivity consists chiefly of fresh cod, herring, clam and beef, varied occasionally with sea-lettuce, a green sea-weed common along our shores. They have at times been fed on cabbage leaves.

The hawksbill does not reach the weight of any of the other species, although it often weighs 300 pounds.

All of the sea-turtles occur in tropical and sub-tropical waters.

The Pacific species of the hawksbill has been found on our Western coast. The Atlantic species is not uncommon in the Gulf of Mexico and northward to North Carolina. All sea-turtles are used as food, green turtles being the most desirable. Green turtles, once very abundant along the shores of the South Atlantic and Gulf States, are becoming comparatively scarce. This is due, not so much to the capture of the animals for food, as to the destruction of their eggs. All sea-turtles

deposit their eggs in sand, above high-water mark. By watching them at night when they come up on the beaches, or by following their conspicuous trails to where nests have been made, the eggs are readily secured.

Green turtles are often found at great distances from land. During the explorations of the steamer "Albatross" off the west coast of Central America, they were taken almost every day. By lowering a boat and approaching the sleeping turtles very quietly, they could usually be harpooned before being awakened. The taking of turtles in this way was a favorite sport with the naturalists of the vessel when the ship was stopped for sounding and dredging, and the ship's company was usually well supplied with turtle steak in those waters. While located for a time at Swan Island, in the Caribbean Sea, the writer assisted in the capture of many large turtles at night when they were on the beaches to deposit their eggs.

On the Pacific coast, where the green turtle has not been taken extensively for market purposes, it is still very abundant. At San Cristobal Bay, on the peninsula of Lower California, about 300 miles south of the United States and Mexican boundary, the "Albatross" succeeded in beaching over 167 specimens at a single haul of a large 500-foot seine.

Attempts are being made in some parts of the Caribbean Sea to raise hawksbill turtles for their valuable tortoise shell plates. A correspondent in Nicaragua says that "kraals" or water pens have been constructed at Great Corn Island off the coast of Nicaragua. The hawksbills are taken here when they come up on the sand to lay their eggs. A tub or half-barrel with the bottom removed is placed over the spot where the eggs are deposited, in order to retain the young as soon as they are hatched out by the heat of the sun. They are then placed in the pens according to their size. Young hawksbills in captivity at Corn Island attain a growth of about 12 inches in eighteen months.

The adult turtles are usually taken in trammel nets, and they are speared sometimes by the natives when seen in shallow water, as they are more often observed on the bottom in such



PHOTOGRAPH

F. R. SANBORN

ATLANTIC GREEN TURTLE.

places than are green turtles or loggerheads. They are both voracious and pugnacious, in fact give considerable trouble by fighting among themselves. They are fed daily on mullet and other local fishes, and also on refuse from butcher shops. After they have reached a length of one foot the growth appears to be slower, or at least less noticeable. The turtle kraals at Corn Island have been in operation for about two years. It has been definitely ascertained that the hawksbill will grow new plates when they have been removed by a hot iron.

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The publications are for sale at the Office of the Society, 11 Wall Street, The Zoological Park, and The New York Aquarium.



PHOTOGRAPH

A GIANT SNAPPING TURTLE

F. M. S.

THE COLLECTION OF FRESH WATER TURTLES.

DURING the present winter the Aquarium has received a number of specimens of large soft-shelled turtles from Florida.

The turtles were sent to various New York markets, where the species was unfamiliar, and there being no ready sale for them, the specimens were procured at very small cost for the Aquarium.

The first lot all died, owing to the rough handling, and doubtless to the still rougher winter weather to which they had been subjected. The second lot, received during the first week in March, came in better condition. Two of the specimens appear to be doing well; they are quite large, the top shell being about 2 feet long. These turtles are common in Florida, and are occasionally sent to the markets with other species.

Other water turtles usually kept at the Aquarium are diamond back terrapin, geographic turtle, Blanding turtle, painted turtle,

spotted turtle, musk turtle, snapping turtle, wood turtle, slider terrapin, Muhlenberg turtle and northern soft-shelled turtle. There have been so many applications for information as to how turtles should be fed and cared for that the following observations may be useful:

As most of our northern turtles hibernate during the winter months, it is necessary to keep them in fairly warm water if they are to be kept active. In a merely half-active condition they do not live long. The collection at the Aquarium is supplied with water having a temperature of about 70 degrees.

The turtles are fed for the most part on chopped beef, earth worms and small minnows, small amounts of chopped fish being furnished at times. As it has never been possible to place the Aquarium collection where sunlight could reach them they have suffered in consequence.

LOBSTER (HOMARUS AMERICANUS.)

Atlantic coast from Labrador to Delaware.

REACHES A WEIGHT OF 25 POUNDS—LARGE SPECIMENS NOW RARE,
BECOMING SCARCE FROM OVERFISHING.

ARTIFICIALLY PROPAGATED BY THE GOVERNMENT.

An important food species, yielding 15 million pounds
yearly, worth one and one-half million dollars.

OVER 30 MILLION POUNDS MARKETING IN 1889.

BROOK OR SPECKLED TROUT

(SALVELINUS FONTINALIS.)

Native east of the Alleghanies from Georgia
to Labrador, and in the Great Lakes region.

EXTENSIVELY INTRODUCED INTO WESTERN WATERS.

HAS REACHED A WEIGHT OF 10 POUNDS IN RANGELY LAKES.

Inhabits cold, clear streams and lakes.

THE MOST BEAUTIFUL AND BEST KNOWN OF AMERICAN TROUTS.

SPECIMENS OF TRANSPARENT LABELS.

NEW LABELS AT THE AQUARIUM.

THE new labels at the Aquarium were prepared for the purpose of answering the questions, respecting fishes, that are usually asked by visitors. These refer to the various names of each species, where found, greatest size, whether edible or not, method of capture and duration of life in captivity.

The labels are transparent and are inserted

in openings just above the tanks. This style of label has been found very satisfactory for aquarium use and has been adopted for the aquariums now building in Detroit and St. Louis.

The idea of transparent labels was worked out at the New York Aquarium.



PHOTOGRAPH

AMERICAN ALLIGATOR.

F. R. SANBORN

THE AMERICAN ALLIGATOR AND CROCODILE.

THE Aquarium has never had a specimen of the American Crocodile (*Crocodilus americanus*) until last summer, when a 9-foot individual was secured. This specimen came from Maderia Island, in the Florida Keys, where it is not uncommon. It was captured there by "Alligator Joe," of Palm Beach, and exhibited with other and larger specimens of its kind at Atlantic City during the past summer.

Large specimens of the crocodile, like the alligator, are now difficult to procure within the limits of the United States, both species having been greatly reduced in numbers, as a

result of the extensive hunting for alligator leather, which has been going on for many years. At the present time the annual value of the alligator hides derived from Florida and Louisiana amounts to about \$34,000; only a small proportion of this amount is derived from the crocodile, which is confined to southern Florida and is not common. Its range southward extends through the West Indies, Mexico and Central America to northern South America. I have observed quite large specimens on the west coast of southern Mexico. Its northward limit in Florida does not extend more than 100 miles from the



PHOTOGRAPH

FLORIDA CROCODILE

E. R. SANDORN

southern extremity of the State. The larger specimens obtained by Mr. W. T. Hornaday, in Florida, measured 14 feet in length.

In addition to the destruction of the alligator and crocodile for their hides, there is perhaps an equal waste of these valuable animals, as large numbers are sold to tourists throughout Florida as pets. Practically none of the young alligators brought north survive more than two years. If these animals could be protected their value as pets, and at the present rate of extermination the valuable alligator leather will soon practically disappear from the markets. At present few individual of either species are permitted to reach any considerable size.

The American alligator and the crocodile are readily distinguishable; the head of the former, especially toward the snout, being nearly twice as broad as that of the latter. In the alligator the teeth are largely concealed by the lips, whereas in the crocodile they are mostly exposed.

GENERAL INFORMATION.

ADMISSION TO THE PARK.—On all holidays and on Sunday, Tuesday, Wednesday, Friday, and Saturday, admission to the Zoological Park is free.

On every Monday and Thursday, save when either of these days falls on a holiday, only members of the Society, and persons holding tickets from the Society, are admitted free. All others pay twenty-five cents for each adult, and fifteen cents for each child under twelve years of age. Tickets are sold only at the entrances.

Admission to the Aquarium is confined to members on Monday and Thursday from 10 A. M. to 12 M. At all other times it is open to the public.

OPENING AND CLOSING.—From May 1st to November 1st the entrance-gates will be opened at 9 A. M. and closed half an hour before sunset. From November 1st to May 1st, the gates will open at 10 A. M.

Bicycles must be checked at the entrances, five cents. All wheels not called for half an hour before sunset will be locked up until the following day.

RESTAURANT.—At the Rocking Stone Restaurant meals are served à la carte every day from 10 A. M. to the closing hour. The North Pavilion of this building has a spacious lunch counter, where all kinds of luncheon food are served at popular prices.

The South Pavilion is now arranged as an open air dining-room. The service has been increased and improved. Large numbers can be served expeditiously.

FEES FOR MEMBERSHIP.

The fees for membership in the New York Zoological Society are as follows:

Annual membership	5	10.00
Life membership		200.00
Patron's fee		1,000.00
Founder's fee		5,000.00
Benefactor's fee		25,000.00

Information and blank forms for membership, may be obtained at the Service Building, at all entrances to the Zoological Park, and at the Secretary's Office, No. 11 Wall Street, New York City.

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Elwin R. Sanborn, - Asst. Editor.

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products of Nature wherever found, they have up to this date been the most supine game-protectors to be found in the higher ranks of civilization.

We purchased Alaska nearly thirty years before the capture of Khartum from the Madhi, but the wild animals of the Egyptian Soudan had game laws to protect them before those of Alaska shared their good fortune. The Egyptian Soudan has a Director of the Department of Game Protection, but even yet Alaska has nothing of the kind.

In America, the game protectors are to-day engaged in a hand-to-hand struggle with the annihilators of wild life. The United States Senate is considering Senator Dillingham's bill No. 4166 for the repeal of the whole Alaskan Game Law. The only measure proposed in its stead is a flimsy and utterly useless license law to regulate the exportation of the hides, horns and flesh of the finest wild animals of Alaska. And this is solemnly proposed "to protect deer, moose and caribou in Alaska!"

To-day there is a possibility that, despite the earnest protests of this Society, the Boone and Crockett Club, the United States Biological Survey, the Audubon Society, the League of American Sportsmen, the Camp-Fire Club and other organizations, the Senate of the State of New York will pass the Hubbs bill, to repeal an excellent law against the spring shooting of water fowl. That measure *has already passed the Assembly*, and the game annihilators from Long Island, and of New York City also, are fighting hard for the repeal of the bill which now prevents them from *shooting wild ducks during their breeding season!*

From Pittsburg to Boston the sparrow-eating Italians of Naples and Sicily are swarming afield on Sundays, killing song-birds for food! These very lawless citizens now constitute such a menace to the lives of valuable insectivorous birds that they require to be specially dealt with. Around Pittsburg, Columbus, and in many portions of Ohio, they have become a dangerous element. On Saturday, March 20th, two Italians were found killing squirrels in the Zoological Park; and the

AMERICANS AS GAME PROTECTORS.

To-day the people of the United States may be divided into three camps. The largest contains those who know little of wild life, and are indifferent to its welfare. The next largest contains the persistent destroyers of wild life—market-hunters and fishers, persons who pose as sportsmen, but are really pot-hunters—and real sportsmen who shoot not wisely but too well. The smallest body consists of the high-class sportsmen and the humane and broad-minded men and women who abhor the wholesale slaughter of harmless creatures, who love wild life, and who are fighting to save the remnant from the annihilation which threatens it.

Americans are so busy building cities and states, amassing wealth, and destroying the

one which was captured by Watchman Van Benschoten spent two nights in jail, and was fined \$5.00.

The New York Zoological Society is composed chiefly of business men and practical women, who are far from being sentimentalists. The organization stands for the protection of wild life, of nearly every kind, everywhere, and at all times save the proper and legitimate open season—not breeding-seasons—for animals that may properly be classed as "game."

It is time for all persons outside the ranks of the Protectors to think on this subject, and decide whether they will join the ranks of the Protectors, or stand with the Annihilators. Ere long the indifferent must by default in good works be classed with the Annihilators!

W. T. H.

THE INSCRIPTION AROUND THE DOME OF THE AQUARIUM.

After the painting of the interior of the Aquarium was completed in January, an inscription in gilt letters was added, which seemed appropriate to the character of the building. It is from one of the oldest books in the world, and is as follows: "They take up all of them with the angle, they catch them in their net, and gather them in their drag, therefore they rejoice and are glad." Men have been fishers since the beginning of time, and the angling rod, the net and the drag (dredge or beam trawl) are all approved fishing devices. There is no greater fraternity than that of the anglers. Just how many fish the sportsmen anglers take is not known; there are no statistics, but the sum total is enormous.

Concerning the yield of the net and the drag we are better informed. Our commercial fisheries are of vast importance. In the United States there are 200,000 professional fishermen, with sixty million dollars invested in fishing appliances, and taking annually fifty million dollars' worth of fish and oysters.

In this country the drag (or dredge) is used only for oysters. In Europe the drag, or beam trawl as it is called there, is of greater

importance. From Grimsby, Yarmouth, Hull and a score of other places in Great Britain, large fleets of both steam and sailing vessels put forth to fish with the "drag." It is with the "drag" that the great quantity of sole used in Europe is secured. The "drag" is used extensively in Germany, France, Belgium, Holland, Spain and other countries.

Those who do not recognize the quotation may consult the Prophecy of Habakkuk (1-15). As Captain Cuttle would say, "Overhaul the Old Testament and when found make a note of."

MORE PUBLIC AQUARIUMS for AMERICA.

During the past year the New York Aquarium has been carefully studied by the Park Commissioners of the City of Detroit, with a view to including its best features in the aquarium now building in that city. The Commissioner of Parks of San Francisco also made an extended examination of the New York Aquarium, as he is greatly interested in having an aquarium added to the attractions of Golden Gate Park.

The Park Board of Buffalo is also interested in the matter, and has been in communication with the Director, who has supplied considerable information respecting the methods of the public aquariums of Europe which he has studied. Outside of New York the only public aquariums in operation in this country are the small ones of the Fisheries Bureau and the Zoological Park at Washington.

Important temporary aquariums have been maintained by the Fisheries Bureau at all of the great expositions held throughout the country since the World's Fair at Chicago. A very fine one is being erected for the St. Louis Exposition.

The Fisheries Bureau has already deposited at the New York Aquarium a number of tropical fishes, intended for the St. Louis Exhibit.

M. Jules Huret, continuing his articles to "Figaro" on his impressions of the United States, writes: "There is one thing, however, the Aquarium in New York, which has no end except beauty. It is very interesting and very extraordinary."



PHOTOGRAPH

SEA HORSES.

E. R. SANBORN.

From a photograph of living specimens, New York Aquarium.

THE SEA HORSE.

THE common American seahorse (*Hippocampus hudsonius*) is found all along the American coast from Cape Cod to South Carolina, and occurs in New York Bay probably throughout the year, as the Aquarium collectors have obtained specimens not only from April to October, but also in February.

Ordinarily it ranges in size from 3 to 6 inches, but on the west coast of Mexico the writer has seen specimens a foot in length, which is about as long as any species ever grows. The sea-horse is probably the only fish which has a prehensile tail; it is decidedly monkey-like in the use of this organ, constantly anchoring itself to weeds, stones and sticks. In fact, it is usually captured in this region by fishermen using pound-nets and gill-nets, with its tail clinging firmly to the meshes of

the nets, even when they are hauled from the water.

Many years ago it was common about the wharves of the East River, where now it probably does not find the water sufficiently pure. This fish is of great interest to all visitors. The eggs, while hatching, are carried by the male in a pouch, and the young are said to return to this pouch for shelter. The body of the sea-horse is encased in a bony shell, in segments. Its swimming movements are very slow, and are performed chiefly by rapid undulations of the dorsal fin. Sea horses are drifted freely by ocean currents. One specimen was kept in a small balanced aquarium for over a year. Usually they cannot be retained so long. The position of the body is usually vertical, especially in swimming, and the head is decidedly horse-like in appearance. In feed-

ing the mouth is brought near the small crustacea, for which it constantly searches, and is suddenly opened. The cheeks being inflated at the same time, the food is captured with the in-rush of water. Sea-horses are found in most parts of the world, becoming scarce in the higher latitudes. Except for their armor of dermal plates they are defenseless creatures, sheltering themselves in sea-weed, where the little creatures get their food.

The Aquarium has adopted the sea-horse in gold design as the insignia for uniform caps.

THE HARBOR SEAL.

One June 2, 1903, the Aquarium lost a fine specimen of the harbor seal. The animal had been in the building for eight years and seven months, which was a long period of indoor life for a wild animal as active as a seal. The immediate cause of her death was pneumonia, but like most other seals that have died in the Aquarium, there was more or less fatty degeneration of the heart, liver and kidneys, due to lack of sunlight and sufficient room for exercise. This was the most active seal that the Aquarium has ever had, and fully one-half of her time was spent swimming about the pool, which accounts largely for her long life. She was the sole survivor of quite a colony of seals that had been with her at various times in the same pool, and survived her companions—seven in number—nearly seven years.

When the seal died, an active correspondence was commenced with fishermen along the Atlantic coast, from southern Massachusetts to northern Maine, and it was not until October 17th that another specimen was procured. It was taken in a fish weir at Nahant, and is still at the Aquarium. An additional specimen taken on the beach at Galilee, New Jersey, March 7th, lived only three days. It was found to be badly injured when taken.

A few years ago harbor seals were not difficult to procure, but during the last three or four years it has been almost impossible to get them. They are in considerable demand for

exhibition purposes in zoological parks and elsewhere.

The present scarcity of seals is doubtless due to the bounties paid in the New England States for their destruction. Correspondence with fishermen, who had formerly been able to procure specimens, and also with State Fish Commissioners, yielded considerable information on this subject.

Massachusetts pays through town or city treasurers \$3 for each seal killed, when satisfactory evidence thereof is produced under oath, together with the tail of the animal. It has been difficult to get statistics on the number killed annually. The State Fish Commissioners are without figures on this point, and a canvass of all coast towns and cities would be necessary to secure them. The city treasurer of Portland, Maine, reports that 1,061 harbor seals were killed in the Casco Bay region between January 1st and September 1st of the year 1903. It is reported that the total catch for that neighborhood was considerably more than this number, as a good many seals were killed and lost. The seal hunters about Casco Bay are mostly Indians, and have been quite active in their search for seals.

Although the Aquarium has placed orders for live specimens in several widely separated localities, and has offered good prices, specimens cannot be had.

The bounty paid in Maine for seals is \$1 each, the State refunding to the towns, money paid for seal bounties.

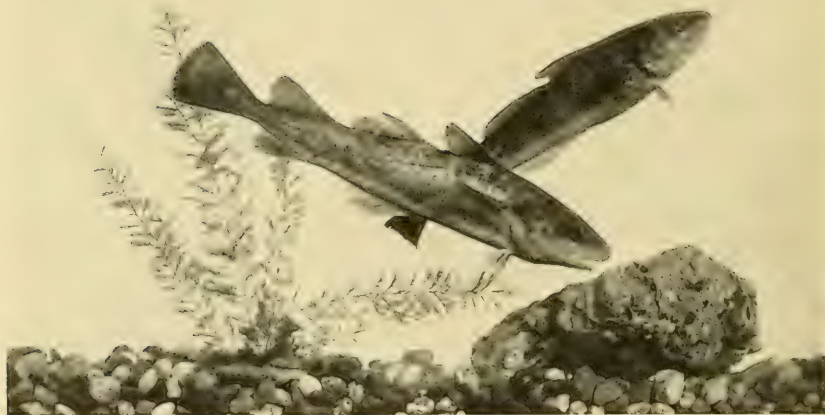
Last year there was scarcely a seal to be seen along the coast, and there is no doubt that the species has been reduced to the merest remnant along our shores. Orders placed with dealers in wild animals have so far been unproductive. The New York Zoological Park is at present without specimens.

The bounty on seals should undoubtedly be removed occasionally. Of course the only persons interested in the destruction of seals are the fishermen. A lively harbor seal getting into a gill-net or pound-net, or weir, undoubtedly does damage, but the race should not be exterminated on that account. The fishermen

if left to themselves would make short work of all kinds of seals, and it has been only through the persistent efforts of naturalists that the extermination of the California coast sea-lions has been prevented. The diminution of the salmon of the Pacific Coast has been due

to human agency. Both sea-lions and salmon were formerly found there in vast numbers.

When salmon are being canned at the rate of fifteen million dollars' worth a year, it is not exactly logical to blame their decrease to sea-lions



PHOTOGRAPHED

TOMCODS

E. R. SANDERS

FOOD OF FISHES IN CAPTIVITY.

THE feeding of as large a collection of fishes as that maintained at the New York Aquarium is a matter involving no small amount of labor and expense. One attendant devotes about one half of each day to the preparation of the food, and as there are generally about 2,000 fishes of all sizes and of about 150 different kinds in the tanks, the attendants who care for them have enough to do during the afternoon to keep them busy.

The food consists of meat, fish, clams, sliced, chopped or minced, as may be necessary

to suit the size of the specimens. The whole collection is fed carefully in order that there may not be an unnecessary amount of food left unconsumed, which would have to be removed to prevent its affecting the water.

During the month of January, 1904, the food derived from the markets was: Cod, 316 pounds; herring, 209 pounds; smelt, 88 pounds; beef, 7 pounds; liver, 9 pounds; a total of 629 pounds of fish and flesh. In addition to this, 6,600 clams were used. This is merely the amount of food *purchased*. A large

supply of natural live food is brought in from the adjacent bays and shores by the Aquarium collector, consisting of minnows, shrimps, mussels, crabs, marine worms, small soft clams and beach fleas or amphipods. More or less live food is always kept on hand in reserve tanks. In summer when live food is easily obtained, a great deal of it is used, being better for the collection in general, while in winter a larger amount of market food necessarily is consumed.

Minnows (*Fundulus heteroclitus*), when procurable in abundance, are used at the rate of 10 or 12 quarts daily, and are simply thrown alive into the tanks where larger fishes soon dispose of them. Shrimps are used to the extent of about 15 or 20 quarts a week; mussels 4 or 5 bushels a year, small crabs, such as fiddler crabs, stone crabs and young blue crabs by the thousand; marine worms 500 or 600 per month; small soft clams 10,000 to 12,000 during the summer season. Beach fleas or amphipods, the small crustaceans sometimes known as sand hoppers, are collected in considerable numbers. The collector secures them by spreading a sheet on the beach at night and placing on it a lantern. When a sufficient number have been attracted by the light, it is picked up by the corners and the beach fleas spilled into buckets. Beach fleas are also secured by hand picking at low tide, and to some extent by digging in the sand.

For fresh water fishes a considerable quantity of angle-worms is desirable. These can be picked up in the summer time about the walks in Battery Park, when they come out after heavy rains.

The interesting little seahorses, usually to be found at the Aquarium, can be kept to good advantage only when they are well supplied with Gammarus, a very minute crustacean, secured by gathering bunches of fine sea-moss, which they inhabit. The seahorses in the tanks are usually seen on the bottom picking this minute life from the weeds. Even under the best conditions it is difficult to supply the seahorses with a sufficient variety of the live food required, and the best specimens have seldom lived longer than a year. It has been

found that the longer a seahorse tank can be left without cleaning the better are the chances for maintaining colonies of Gammarus for its food.

Young trout and salmon in the fish hatchery are fed successfully on minced liver, and they are also very fond of herring roe. At the New York Aquarium herring roe has proven to be an excellent food for young whitefish. These are so difficult to raise that the fry in Government fish hatcheries has usually been turned loose in the streams when very small. By feeding on herring roe the Aquarium has succeeded in carrying whitefish through the critical period of infancy, and at the present time has specimens a year old and 6 inches long.

All the fish food from the markets is headed and eviscerated before being cut up, as market fish are frequently kept too long for any part of the viscera to be wholesome.

The cost of the market food used at the Aquarium averages about \$100 per month. The various kinds of live food brought in by the collector in connection with his regular work of capturing specimens for exhibition is valued at about half that amount.

During the past five months the collector was kept extremely busy as a purveyor to the sea-cow or manatee. This animal, which was a hearty feeder, turned up its nose at lettuce and other wholesome garden vegetables, insisting on a diet of salt-water eel-grass and pond weed. It chewed up exactly 90 bushel baskets of eel-grass and 20 of pond-weed during the five months that it lived in the Aquarium.

Carp, which are largely vegetable feeders, are fed at times on soaked wheat, and the sea-turtles, in addition to fish food are sometimes supplied with small quantities of cabbage leaves and sea-weed.

The attendance at the Aquarium during the year 1903 was over one and a half millions, nearly twice that of the Metropolitan Museum of Art. It stands alone as a record of attendance among free public institutions.



TOMCOD.

NOTES.

The total number of teachers and students visiting the laboratory of the Aquarium for nature study, during the year 1903, was 2,620. They came from high schools, training schools for teachers, the Normal College, universities and private schools. There were teachers also from Massachusetts, New Jersey, Pennsylvania, Ohio, Maryland, and Kentucky, and one from both Switzerland and Porto Rico. Eighty-three institutions were represented in all.

Dr. Cyrus W. Field, Jr., made extensive experiments in the laboratory on behalf of the New York City Board of Health, relative to the possibility of infecting oysters with the bacillus of typhoid fever. It was proven that oysters living in aquaria are easily infected when cultures of *Bacillus typhosus* are planted in the water. This shows the danger of fattening oysters in creeks containing sewage. The results of his observations will be published in full in the Annual Report of the Zoological Society.

It is expected that the increase in light in the Aquarium building, by means of enlarged skylights, will have a wholesome effect on the colors of fishes exhibited there. Many of the more brilliant fishes

from the tropics lose their high colors very rapidly after coming to the Aquarium; the majority of the species becoming faded. This is true to a similar extent with our native fresh water fishes. The surroundings of the specimens also have considerable to do with their colors while on exhibition. Specimens placed in tanks lined with white tiles are many degrees paler than specimens of the same species kept in tanks with dark backgrounds. The nature of the food and the character and temperature of the water are also factors in causing loss of color.

* * *

There are 27 striped-bass, which have been in the Aquarium 10 years. These specimens have been kept continuously in a pool lined with white tiles, and with one exception have become so bleached out that at present they have little of their original color left. It is a remarkable fact, the only specimen in this lot of fishes which retains its original color undiminished is *totally blind*. Sunfishes are very quickly affected by their environment, losing perhaps four-fifths of their color when placed in tanks having light backgrounds.

THE FISH HATCHERY.

The fish hatchery at the Aquarium is again in active operation. Early in the year it was stocked with eggs of the following species: Rainbow trout, brook trout, lake trout, brown trout, California salmon, Atlantic salmon, landlocked salmon, and white-fish.

The California, or Quinnet salmon eggs, have already hatched and the fish will be reared at the Aquarium for exhibition purposes, as this is a species seldom seen here. Most of the other young fish, with the exception of the white-fish, will be distributed in New York waters. Last year the output of the hatchery was over 2,000,000 fish, representing about one dozen different species. A good series of each was retained for exhibition.

Owing to the difficulty usually experienced in the Government fish hatcheries in raising white-fish in confinement, nearly all those hatched at the Aquarium were sent to Lake George. The few individuals retained were given special care, and the results warrant a serious attempt at raising all of this year's fry. We now have specimens 6 inches long.

The white-fish now hatching will all be retained and reared for exhibition, as fishes born in captivity are much better for permanent exhibition than wild specimens.



Fig. 1. — Inflated.



Fig. 2. — Normal.

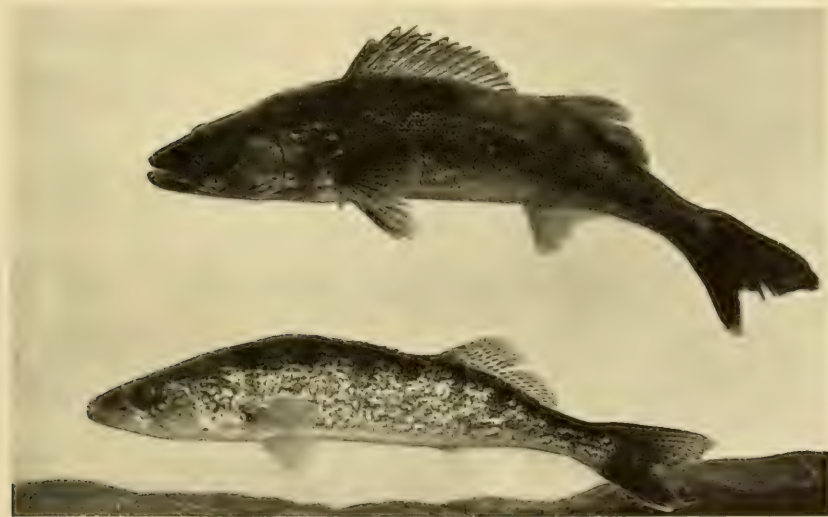
PUFFER

Showing the puffer in both normal and inflated conditions

At present the hatchery affords a good exhibit of fish-cultural methods, there being eggs and fry in various stages of growth. The exhibit is one which is of decided interest to visitors, especially when its meaning is explained.

The Atlantic salmon reared in the Aquarium are now two years old and are splendid specimens. It is expected that a like success will attend the raising

of the Pacific species. The Pacific salmon is the most important of all fresh water fishes; it some times reaches a weight of 60 to 80 pounds, and is one of the handsomest and most valuable fishes in the world. The yield of the Pacific salmon fisheries, from California to Alaska, is worth probably \$15,000,000 a year, and the canned product is marketed throughout the world.



PIKE PERCH



PIKE.



PEARL ROACH AND GOLD-FISH.



SURGEON FISH



SHORT-EARED SUN-FISH

ZOOLOGICAL SOCIETY BULLETIN

No. 14

PUBLISHED BY THE NEW YORK ZOOLOGICAL SOCIETY

July, 1904

THE BIG SERPENTS.

By RAYMOND L. DITMARS,
CURATOR OF REPTILES.

OWING to their large size and brilliant colors, the boas and pythons, representing the Family *Boidae*, are among the most interesting inmates of the Reptile House. Forty-eight specimens of these showy serpents, representing eleven species, are now on exhibition.* The collection of boas and pythons contains not

only the huge pythons of tropical Africa and India, and the gorgeously-hued "Boiguacu" of South America, but lowly forms as well, such as the Rubber Boa, a diminutive burrowing species of the western United States, and the remarkable Sand Boa, or "Two-Headed" Snake, of Egypt.

The boas proper, constituting the subdivision



PHOTOGRAPH

REGAL PYTHON.

E. R. SANBORN

Photographed to show the great length which this species attains.

* So thoroughly representative is this collection that a map showing the distribution of the two subdivisions of the *Boidae* (the *Boinae* and *Pythoninae*) has been prepared, together with a large descriptive label, which will be framed and placed in front of the large python cage.

JUL 12 1904



PHOTOGRAPH

COMMON BOA

E. R. SANBORN

One of the most brilliantly colored species of the Boidae.

Boinae of this family, are not, as is popularly supposed, confined to the New World. The majority of the species, and in fact all the larger ones, inhabit tropical South America, southern Mexico, Central America and the West Indies. One small species occurs in the extreme western portion of the United States, as far north as Oregon. The genus *Eryx*, however, composed of small burrowing forms, inhabits Africa, southern Europe and Asia. Two fine species belonging to the genus *Boa* are found in Madagascar; and several other genera are represented in the Old World.

In the New World, the largest of the boas is the Anaconda, or Water Boa, of tropical South America, a species alleged to attain a length of twenty-five feet or more, but specimens of such dimensions appear to be so exceedingly rare that they never find their way into captivity. Two fine specimens of this aquatic snake are on exhibition in the Reptile House. The largest specimen, measuring sixteen feet in length, recently gave birth to thirty-four young. The young snakes are being carefully fed, and it is anticipated that the majority of them may be reared. At time of birth they were twenty-seven inches long, and of much the same coloration as the parent. Like the adult, they are very vicious, and resent handling. Quickly twisting from side to side, they endeavor to snap at the hands of their keeper. Most of their time is spent in a large tank, where they swim slowly

or mass themselves in a corner with only their snouts above the water.

The birth of these little snakes illustrates a characteristic predominant among the boas, the majority or possibly all of which are viviparous, bringing forth their young alive. The pythons, on the contrary, lay eggs, over and about which they coil, and so remain until they hatch, after some six or eight weeks' time. The writer has several records which tend to demonstrate that the progeny of all the *Boidae* are very numerous. One of these relates to a large specimen of the Common Boa (*Boa constrictor*), which gave birth to sixty-four living young. Another is a note from Antwerp, where an Anaconda, fifteen and a half feet in length, gave birth to thirty-seven young. Various records show that the pythons deposit from fifty to one hundred eggs. A twenty-foot Regal Python in the Reptile House deposited sixty eggs, about which she coiled, and from her position fought off all intrusion. Her efforts at incubation proved of no avail, however, as the eggs were infertile.

The growth of the young anacondas in the Reptile House will be noted with great interest. Captive-born snakes usually feed readily, and in consequence grow rapidly. It is hoped, therefore, that there will be an opportunity to ascertain the limit of size attained by this species. Although popular supposition says twenty-five feet, we



PHOTOGRAPH

WEST INDIAN BOA

A species confined to the West Indies

find captive specimens quite mature, and bringing forth young, at sixteen feet in length. The writer believes that the addition of a very few feet to this figure would represent the maximum dimensions of the species.

Another New World boa, and one of the most beautiful of serpents, is a snake well known by its scientific name. This is the Common Boa, both technically and popularly known as the *Boa constrictor*, a native of tropical South America and the West Indies. Three handsome specimens are on exhibition. Owing to its good temper and docile nature, this species of boa is eagerly sought by snake "charmers," but it is not, however, really common in captivity.

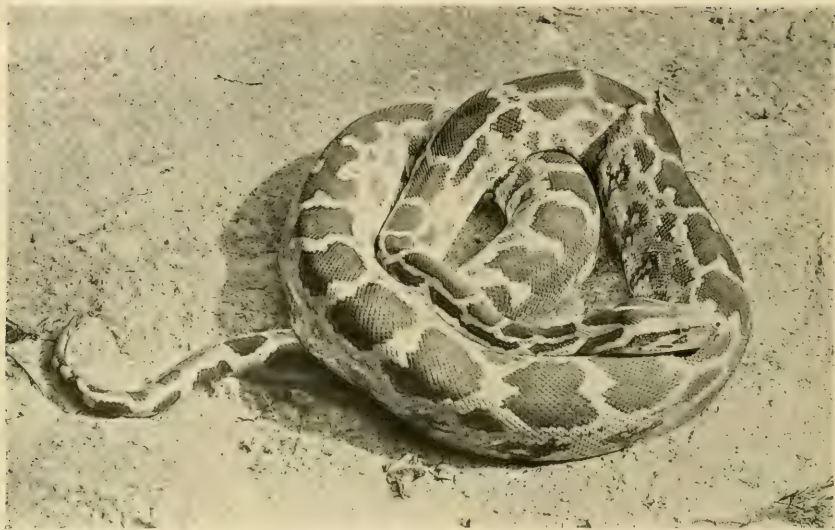
Although all species of boas and pythons are constrictors, it must be understood that scientific classification has seen fit to separate the boas from the pythons. This being the case, it can be appreciated that the indiscriminate practice of calling all the large snakes "Boa constrictors" is far from correct. The genus *Boa* contains seven species, and the name *Boa constrictor* is the scientific title of the most widely-known South American species, the Common Boa.

The Common Boa is not a particularly large serpent. A full-grown adult will measure ten feet, but the average length of a mature specimen is from eight-and-one-half to nine feet. Another snake of the same genus, on exhibition in the Rep-

tile House, is the West Indian Boa, (*Boa divini*), a species inhabiting Dominica, St. Lucia and Trinidad, and attaining a length of about eight feet. In its form and pattern, this serpent much resembles the Common Boa, but may be distinguished by its much darker colors, which impart to it a somber aspect. Specimens of this snake that have recently shed their skins gleam with the iridescent luster which is often to be noted among the larger constrictors, and usually denotes a state of good health.

Closely allied to the preceding species is another interesting serpent, known as the Mexican Boa, (*Boa imperator*). This is a smaller species, and in its rich color-pattern it suggests the *Boa constrictor*. Our specimen was captured in Central America, and is but half grown. It makes up for its small size by an energetic display of temper, and usually may be observed lying coiled almost in a spherical mass on the topmost branch of the tree in its cage.

Compared with the graceful forms of the majority of the boas, the Tree Boas are quite grotesque. The neck is extremely long and slender, and the head so large and broad that it appears as an incumbrance to the snake. Moreover, the head is pointed at the snout and very broad in the rear, imparting a venomous aspect to the reptile. With its flat body wrapped tightly about a limb, the prehensile tail likewise employed, and the long



PHOTOGRAPH

AFRICAN ROCK PYTHON.

E. R. SANBORN

Of docile nature, and often seen in travelling shows.

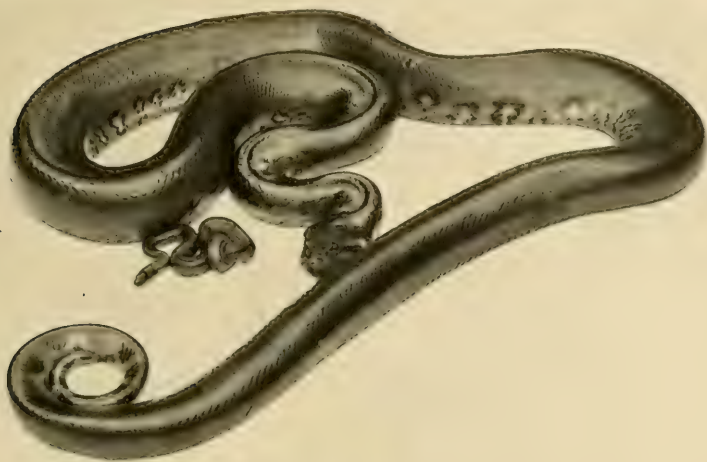
neck looped fantastically in the air in support of the hostile head which poises to strike, an angry tree boa appears far removed in classification from its ponderous allies of the family *Boidae*.

Owing to their secretive habits the other boas in the collection are not frequently seen by visitors. One of the most interesting specimens is a Sand Boa, (*Eryx jaculus*), from Egypt. This species is sometimes known as the "Two-Headed" Snake, owing to the bluntness of its tail, which so closely resembles the head that the two extremities might for the moment be mistaken for one another unless the reptile be closely examined. The Hindoos practice a deception with this creature by painting a mouth and eyes on its blunt tail, and exhibiting it as a reptile with two independent heads, explaining that while one sleeps the other watches, to protect the eccentric creature from harm. In its habits the Sand Boa is subterranean, digging its way into loose sand, or following the burrows of the small mammals upon which it feeds. It seldom attains a length of more than two feet, and its colors are dull and few, to match the soil in which it lives. Seven species of the genus are known, and all are confined to the Old World.

The diminutive Rubber Boa, (*Charina bottae*), an inmate of the Reptile House, but seldom visible

to the visitor, is yet a smaller member of the *Boidae* than the African species. This pigmy burrowing constrictor appears to extend its range farther into the temperate regions than any other species of the Family. It inhabits the Pacific Coast region of the United States, and is even found as far north as Oregon. It is pale gray in color and very cylindrical in form, with a small, blunt head, not at all distinct from the neck. Captive specimens feed upon very small rodents, and unless provided with fine dry sand, in which they can burrow, live but a short time. The average length of a mature specimen is about eighteen inches.

The Subfamily *Pythoninae* of the *Boidae* contains as great a variety of forms as exists in the *Boinae*. This group contains the largest species of the great constricting snakes, several of which attain a length of slightly over twenty feet, as actually demonstrated by the measurements of various captive specimens. Undoubtedly the largest species of serpent now living is the Regal or Reticulated Python, (*Python reticulatus*), which attains a length of at least twenty-four feet, and possibly greater dimensions. This splendid serpent is well represented in the Reptile House by five specimens, two of which are over twenty feet in length, and weigh nearly two hundred pounds each. Pos-



PHOTOGRAPH

ANACONDA

F. R. SANFORD

Adult, and young specimen three weeks old

sessing a color-pattern of a richness that rivals oriental tapestry, together with an iridescence which gleams in all the high-lights of their folds, these great serpents are the stars of a large collection of cold-blooded creatures.

In captivity the Regal Python prefers to feed on poultry, and can engulf entire and without difficulty an eight-pound rooster, in full feather. Two such fowls usually constitute a substantial meal, but a very hungry snake will consume four chickens of this size, and be ready for more within ten days' time. During the first few months of confinement very large specimens of this snake appear to suffer from the restraints of captivity. They steadily refuse food, and if energetic measures are not employed, they become emaciated, and gradually starve to death.

Whenever a large serpent is thus languishing and approaching a suicidal end, it is necessary to feed it by force, and thus either awaken or counteract its sluggish appetite. Young rabbits are killed and tied together with brown twine, the snake is held by the keepers in as straight a position as possible, and by means of a pole the meal is forced down its throat a distance of about six feet. Food thus administered usually changes the snake's demeanor toward captivity. With the meal once

digested, there comes an appetite for food, which usually can be detected by the snake's actions, although for a time the reptile may lack sufficient courage to feed voluntarily. Careful attention on the part of the keeper is usually successful, and renders a repetition of compulsory feeding unnecessary, although occasional specimens are very stubborn. The Regal Python "Czarina" was fed forcefully for ten months before she took her first voluntary meal.

The average visitor to the Reptile House, while examining the richly-tinted coils of the big pythons, little realizes that the iridescent bloom reflected from the scales denotes a state of perfect health which is brought about only after many weeks of sympathetic care on the part of the keeper.

Rather smaller in size, though one of the largest of the species forming the genus *Python*, is the Indian Rock Snake, or Black-Tailed Python, (*Python molurus*). Two specimens are on exhibition, each being about sixteen feet in length. Both have been in the Reptile House over two years, and are slowly growing. This species occasionally, though rarely, attains a length of twenty feet. Though not so handsome a serpent as the Regal Python, it is more hardy, and becomes more readily accustomed to captivity.



MEXICAN BOA.



SAND BOA.

Compulsory feeding is seldom necessary with snakes of this kind. They prefer small mammals to fowls, but it is quite unnecessary that their food should be offered alive.

In distribution this serpent differs somewhat from the Regal Python, being common in India, and extending into but one of the larger islands—Java. The larger species of the mainland is confined to Burmah, Indo-China and the Malay Peninsula, and is distributed throughout the Malay Archipelago. In captivity both the Regal and Black-Tailed Pythons are vicious, and resent any familiarity on the part of the keeper. Their long, recurved teeth are capable of inflicting severe wounds. Owing to their hostile nature, these handsome reptiles seldom are exhibited with travelling shows.

In direct contrast to the irritable East Indian species, is the African Rock Python, (*Python sebae*), a richly-marked reptile which attains quite substantial proportions. It inhabits the tropical and southern portions of Africa. The average length of mature specimens is about twelve feet, but occasional specimens will measure from fifteen to eighteen feet. In proportion to its length, it is a very thick-bodied serpent. A coiled specimen eleven or twelve feet long presents greater bulk, and consequently appears much larger than a Regal or Black-Tailed Python of a length of fifteen or sixteen feet. The head is quite small, yet mature specimens feed upon fair-sized prey such as the smaller species of antelope, which are seized as they pass in close proximity to undergrowth on their way to water.

A fine specimen of the African Rock Python, in the Reptile House, is only nine-and-one-half feet long, but it slightly exceeds in weight a specimen

of the Regal or Reticulated Python, fourteen feet long. The body is a delicate shade of tan. Down the back is a series of large, olive-brown saddles, and on each side of the head is a broad, pinkish band. Few species of the larger snakes so quickly become docile in captivity, or are more hardy if properly cared for, than this African constrictor. It is the snake most frequently exhibited by circus performers, and owing to its good nature, and its ability to endure rough handling in transit, it is a prime favorite with travelling showmen. Moreover, large numbers of these snakes are captured annually and shipped from Africa to various parts of Europe and America. Hundreds are received in the United States every spring and sold to the various shows, in which they are exhibited as "Philippine Boa Constrictors," or "Man-Eaters," or otherwise exploited by the professional snake enchanter who poses as an exponent of the hypnotic art.

It is a common belief that pythons may be distinguished from boas by the presence on the lip-plates (labials) of the former of a number of pits. This is partially true, yet not altogether a definite distinction. Although the majority of the pythons possess these pits, so prominently developed that they appear to be of some functional value to the reptile, it might incidentally be stated that various species of boas also possess pits, which in the genera *Epicrates* and *Corallus* are as well developed as in any of the pythons. An example of the former genus is the Cuban Boa, (*Epicrates angulifer*), a thick-bodied species, attaining a length of ten feet, and confined in its habitat to the island of Cuba. It is the only large constrictor inhabiting the island, and though of a dull brown color, when in a bright light it shows a high degree

of iridescence. Large specimens of this snake have been on exhibition in the Zoological Park for the past four years.

The structural differences between the pythons and the boas consist chiefly in the bones of the skull and the arrangement of the plates on the head. The former characters can be noted only by the examination of an osteological preparation, and even then unless the observer is equipped with technical knowledge they are very obscure. The

arrangement of the head shields offers so many variations and intergradations that the character is but a feeble one on which to form the two Sub-families. Generally speaking, it must be stated that to the popular eye there is little structural difference between a python and a boa. The Sub-family containing the latter (the *Boinae*) includes the larger number of species of the Family of great constrictors.

LONGEVITY OF FISHES AT THE AQUARIUM.

The oldest inhabitants of the New York Aquarium are the striped bass, which have been here for ten years, having been placed in one of the floor pools before the building was opened to the public.

In May, 1894, 55 specimens, weighing from a quarter of a pound to four pounds, were secured, 27 of which have survived. Most of those that were lost, died during the first year, and during the last four years not one has died. Their food has been chiefly live minnows, supplemented by live shrimp, small crabs, marine worms, and occasionally, when other food was scarce, herring cut in strips and a few clams were used. Their growth during these ten years has probably been all that could be expected from fishes confined in a limited space and deprived of much of their natural food. The largest specimen now weighs about 30 pounds. Their actual weights are not known, but the lengths of some of them are, and the weight estimated accordingly. One individual received in 1896, when it weighed a quarter of a pound, and had a length of seven inches, died seven years later, by which time it had attained a length of 26 inches and a weight of 9 pounds.

They are sea fishes which enter fresh waters to spawn, and are very active and gamey. It is quite remarkable that such large fishes have done so well.

In our markets this species averages 12 pounds in weight, but often attains a large size, specimens of 60 pounds being common, while the weights of extra large ones weighing from 90 to 112 pounds have been recorded.

Other species in the Aquarium which may be considered old residents are the bony gar, mud-fish, common eel, gray snapper, spot snapper, red grouper and Nassau grouper. Several individuals of each have pulled through seven years' service. They are supposed to require pure sea-water, but have endured New York Bay water just as it has been pumped from the Bay, in varying conditions of saltness, freshness, muddiness and wharf-front filth. They have not complained, but for days together the poor character of the water supply has put the whole collection off its feed.

Four of the species named above are from the Bermuda Islands, where the density of the sea-water is not lessened by the presence of rivers. Their length of life at the New York Aquarium, where the water often becomes three-quarters fresh, is quite remarkable.

Other well-seasoned old-timers which have been here from four to five years are the moonfish, squirrel-fish, Mississippi catfish, weakfish, green moray, amber fish, rock-fish, bergall, striped grunt, blackfish, angel fish, surgeon fish, trigger fish, cow-nosed ray, common sturgeon, short-nosed sturgeon, sheepshead, minnow, stickleback, drum, channel bass, yellow mackerel, toad-fish, tench, goldfish, muskallunge and pike.

All other species have so far led Aquarium lives within the three-year limit.

The growth of some of the above-named fishes has been steady. The Bermuda gray snappers, received here 6 inches long, have more than doubled their size in seven years; while the spot snappers have fully trebled their size in the same time. Although the green morays have fed intermittently, refusing food for months at a time, they have grown perceptibly. Measuring a green moray nearly 7 feet long and with jaws opening 6 inches wide is dubious business, which as yet no one has had the courage to undertake. The growth of muskallunge and pike has been quite marked, both species having more than doubled their weight. The weakfish have trebled their size in four years. The blackfish (*Tautoga onitis*) have grown slowly, specimens one inch long when received having grown only 7 or 8 inches in seven years. Other blackfish, however, which were 8 inches long when brought here, doubled their size in one year.

A Mississippi catfish, now weighing about 60 pounds, has increased its weight perhaps one-third in four years in spite of the fact that it lies dormant when the water gets cold, and does not feed at all from September to April.

Many of the most attractive fishes in the collection have not lived long enough to permit of observations being made on their growth.

The collection of tropical fishes from Bermuda has been increased every summer. These beautifully colored strangers, which are viewed with great interest during the summer and autumn months, begin to die off with the approach of winter weather.

A large sturgeon 8 feet long lived in the Aquarium 3 years, which was probably a good record for a mud-loving animal transferred to a clean, hard-bottomed tank. It would not be desirable to put mud in an exhibition tank.

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Elwin R. Sanborn, Asst. Editor.

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A DANGEROUS EXPONENT OF NATURE.

Most men who love the works of Nature are little given to criticising others in print; but there are times when the expressing of one's opinion becomes a matter of duty.

When men begin to sow broadcast through our schools, and amongst young people generally, unlimited quantities of questionable seed, it should be very carefully inspected. Messrs. Ginn & Company's elaborate defensive pamphlet of "William J. Long and His Books" is a reminder that Mr. Long is now a public issue, and one not to be ignored by those who care for real natural history.

Mr. Long now has nine books on the market, four of which are published specially for school

use, at fifty cents each. Presumably they are already in a great many schools; and yet, no other American writer calling himself a naturalist ever has been so universally condemned by real naturalists, both in and out of print, as has William J. Long. Among his defenders and exponents, so far as we know there is not one person who is a naturalist.

To all persons, young and old, who are interested in Nature, who desire to learn only what is true, I express the belief that Mr. Long is the most visionary writer who has ever appeared before the American public in the guise of a naturalist. Any man with unlimited capacity for swallowing, as gospel truth, every silly story that is told to him by the wild-animal liars of this world, is to be pitied; but when any man combines with limitless gullibility, a vaulting imagination which places upon the acts of wild creatures only the most far-fetched and wonderful interpretations, he is to be feared and avoided.

If William J. Long has seen all the wonderful things in wild life that he says he has seen, then has he observed more marvels of Nature than all other American naturalists added together. He writes smoothly worded and pleasing fiction about the wonderful wisdom and superhuman doings of wild creatures, and vows that it is all true. Any man who is able to swallow so palpable a hoax as the oriole's nest, illustrated in a recent number of "Science," and describe it as a genuine product of unassisted Nature, is about as wise as a chipmunk; and as a guide to the works of Nature he is about as valuable and safe as a mole.

Mr. Long is a scholar, with a command of language that any revivalist might envy. His marvelous tales of the wonderful things he has seen done by wild creatures gush forth like water from an open hydrant. We have seen that for an hour and a quarter he can hold his hearers spell-bound "with a degree of hadmiration amounting to hawe." To him no phase of Nature is mysterious; and in everything, from telepathy in the moose

to the ratiocinations of a kingfisher, his cocksureness is fairly sublime.

The objectionable point of all this lies in the fact that Mr. Long continually and persistently conveys to the minds of people who know little of Nature, totally false impressions of the mental capacity of wild animals. To those who think this is proper and right, I have nothing to say; but to those who wish to know of animals only the things that are true, I would say, prove all things, and hold fast that which is good.

Let it not be understood, however, that I condemn the fiction stories of animals that openly stand as fiction. On the contrary, such wild-animal hero-tales as "Mooswa" and "The Outcasts," by W. W. Fraser, are not only harmless, but decidedly healthful and beneficial, especially to the young. They do not pose as true stories, and even the youngest child is not betrayed into false conclusions.

W. T. H.

NEW MANATEES AT THE AQUARIUM.

The Aquarium has received a pair of manatees from Lake Worth, Florida. The larger specimen—a female—is eight-and-one-half feet long. They were captured by Alligator Joe of Palm Beach, and were taken in a large drag seine. Trials were made at different times for nearly a month, at least seven manatees breaking through the net before a capture was made. The largest one observed was over ten feet long. Both animals have already made themselves quite at home in the large pool in which they have been placed. They appear to be affectionate, usually keeping close together, and frequently rubbing noses.

The female has a trick that is entirely new to the Aquarium men. When the water is drawn from the pool for tank-cleaning, she promptly rolls upon her back, remaining in that position until the water returns. She is quite large and heavy, and is probably more comfortable on her back, considering the weight of her bones. All

members of the sea-cow group have the densest and heaviest bones known among mammals.

LAWRENCE WARBLER BREEDING IN THE ZOOLOGICAL PARK.

The most interesting wild bird which has been observed breeding in the Zoological Park is the Lawrence Warbler (*Helminthophila lawrencei*, Herrick). On June 13th of the present year Dr. Wiegmann and myself found a male Lawrence Warbler mated with a female Blue-winged Warbler (*H. pinus*), both birds carrying food to a brood of six young birds in a ground nest. The young birds all left the nest in safety on June 16th. This is the twelfth Lawrence Warbler to be placed on record, and the first recorded instance of its breeding.

Details of this record will be given in the next issue of the *Bulletin*.
C. WILLIAM BEEBE.

The impending departure of Dr. Mayer for his new field of activity rendered it necessary for the trustees of the Brooklyn Institute of Arts and Sciences to select and appoint a new director for its museums. The choice fell upon Mr. Frederic A. Lucas, who for twenty-two years has been one of the most prominent members of the staff of curators in the United States National Museum. As a specially trained and experienced museum-builder, Mr. Lucas stands in the first rank of curators, and has few equals, either in this country or any other. His specialty is comparative anatomy and paleontology, but besides that he is an all-around naturalist, with the general breadth of knowledge which is imperatively necessary in the director of a museum which embraces all branches and classes of Nature.

Mr. Lucas' two very entertaining and breezy books, entitled "Animals of the Past" and "Animals Before Man in America," afford an excellent index of his keen sympathy with the general public, and his success in reaching the unscientific reader with the facts and figures of science. It is gratifying that the loss of so good a man as Dr. Mayer has been compensated by the selection of so good a man as Mr. Lucas.

FEEs FOR MEMBERSHIP.

The fees for membership in the New York Zoological Society are as follows:

Annual membership.....	\$ 10.00
Life membership	200.00
Patron's fee.....	1,000.00
Founder's fee.....	5,000.00
Benefactor's fee.....	25,000.00

Information and blank forms for membership may be obtained at the Service Building, at all entrances to the Zoological Park, and at the Secretary's Office, No. 11 Wall Street, New York City.



SKIMMER, 14 DAYS OLD.



LEAST TERN, 21 DAYS OLD.

NOTES ON HATCHING AND REARING SEA-BIRDS.

By C. WILLIAM BEEBE,
CURATOR OF BIRDS.

Illustrations from photographs by the author.

IN July of last year when we returned from our trip to Cobb Island (*vide* Annual Report of the Zoological Society for 1903, pp. 161 to 181) we brought with us some two dozen eggs of various sea-birds. These were from the nests of black skimmers, common terns, laughing gulls, clapper rails and green herons, only one egg being taken from each nest, and all in advanced stages of incubation. At first no special care was taken of the eggs, as the embryos were intended for embryological study, and three days elapsed between the time of collecting them and the date of their examination. They were brought to New York in an empty kodak case, and several were cracked or partly broken on the way. The temperature during this time ranged from 60° to 80°. These apparently unfavorable conditions were sufficient to keep the embryos in a living active state. Their vigor was so pronounced that the eggs were placed at once in an incubator, in a temperature of 102°, with the result that almost all, even the cracked ones, hatched within from one to five days.

I devoted what time I could spare to feeding and watching the first quintet of these little fellows, hatched so far from their home among the Virginia sand dunes, and a few hasty notes taken during the first two weeks of their existence seem worthy of record. These five birds were: Two common terns (*Sterna hirundo*), a black skimmer (*Rynchops nigra*), a laughing gull (*Larus atricilla*),

and a green heron (*Butorides virescens*). For convenience of observation, all the birds were confined together in a large wooden box, glass-fronted, wire-roofed and with a flooring of fine, white sand.

July 23.—Tern number one hatched at 6 A.M.

July 24.—Tern number two and a skimmer emerged at 6 A.M. All the birds which hatched from this lot of eggs broke shell early in the morning except the green herons, which appeared to be governed by no time rule.

This morning I removed tern number one from the incubator, and fed him a number of times with macerated fish, the little fellow readily opening his mouth for food.

While yet wholly within the egg terns utter a *peep! peep*, much like a chicken, but the instant they tumble out, before their feathers have begun to dry, they utter the typical *tear-r-r* of the old birds, only, of course, very fine and weak in tone. When calling for food their utterance is an oft-repeated, indescribable sound which may be perfectly imitated by drawing air in between one's teeth. The *tear-r-r* is always given when the young birds are suddenly awakened from sleep.

July 25.—A little green heron hatched to-day, pot-bellied, with immense yellow feet and legs—as unlike the terns as can be imagined.

The second tern and skimmer were placed in the sand box. Tern number one has weak thighs, his legs sprawling out sideways, refusing to sup-



HEAD OF ADULT SKIMMER.

port him, so he shoves himself along the ground instead of walking—ergo his name of identification, Sprawler. The other tern has gained strength very quickly and explores his entire range. For convenience, I call him Samson.

Skimmer—a pathetic little pinch of sand-colored down—keeps his flattened bill tight shut, and cheeps through his nostrils. I force food into his mouth, when it is swallowed with evident satisfaction, but unlike the terns he gives no hint of how his parents proceed to get food into him. His bill is very different from that of a tern, being much thinner and higher, and from the first the lower mandible is longer than the upper.

All the birds refuse salt water, but eagerly swallow drops of fresh water from a medicine dropper.

July 26.—The little heron has an enormous gape, and is able to swallow a very large pellet of macerated fish. Yesterday his abdomen protruded to such an extent that he could not maintain an upright position. Now it is reduced so that he can sit on his tarsi and his promise of a tail, and frantically wave his skinny wings, indicating thereby an inward want.

Once he tumbled out of his bed of twigs upon the sand, and the distress which this material—the delight of the terns—caused him, showed how totally unlike are the needs of young birds. He

rolled over and over, his mouth, nostrils and eyes filling with sand—a most miserable object until I rescued and washed him.

I undertook to cure the weak-limbed Sprawler, and tied a short thread to each tarsus, bringing his legs together. At once he stood upright, tremblingly at first.

Skimmer, although taking food with such difficulty, has made the record for pecking. Early this morning he pecked at a piece of cheesecloth, then at some sand, and finally picked up and ate a tiny piece of fish. Samson, who follows Skimmer about, watched him peck, and soon after pecked a number of times ineffectively at black specks.

Toward evening the terns refuse food and become very restless, toddling or running about their box, trying to climb up the sides and showing very plainly that they desire or expect something, but what it is I cannot guess.

Samson, although twenty-four hours younger, is ahead of Sprawler in powers of observation and coordination of movement—probably due to his greater ability to get about. The young birds were fed every fifteen or thirty minutes all day.

July 27.—A laughing gull broke its shell this morning, but could not escape from it. At 11 A.M. I helped him emerge, when he instantly gave a harsh, rolling call. As there were many valuable duck and other birds' eggs in the incubator, the temperature could not be lowered for the hatching birds and, owing to this, the gull dried while partly in the shell and therefore has a permanent bend in his neck. He is very lively, however, and at 4 P.M. eagerly swallowed some fish.



HEAD OF IMMATURE SKIMMER.

Sprawler's name is now meaningless, as he is rapidly learning the use of his legs as supports, instead of sand-oars, thanks to the surgical thread.

When the shadow of my hand passes over them the terns and skimmer crouch as closely as possible to the sand, but when I speak to them they rush toward my approaching hand, which they have already learned means food. At a temperature of 110° in the direct rays of the sun, they pant violently. At 75° they shiver; and 90° in the shade seems to satisfy them best.

When eager for food the terns gape widely, straight upward, and flutter their wings vigorously. The heron pecks forward, or often downward, while the skimmer, when excited by the touch and smell of a bit of fish, pecks very ineffectively, turning his head to the right and then reaching straight ahead. I still have to force his bill open to get the pieces of soft fish far enough down for him to swallow them.

At 12 A.M. to-day Skimmer's bill measures $9\frac{1}{2}$ mm. in height across the nostrils, while Samson's mandibles are only 5 mm. at the same point.

At 2 P.M., after sleeping most of the morning, Heron waked up and showed remarkable energy. From his elevated vantage point in the small stick basket he surveyed the terns and even followed them as they walked about the edge of the twigs, ambling on his tarsi (his toes being not yet uncurled) and pecking at their heads.

There is a decided difference in color between the terns and the skimmer. The terns are light yellowish above, with tufts of black scattered on the back and wings. The chin and upper throat, and the face below the eyes are black. The remainder of the under parts is fluffy white. The feet and legs are reddish, the bill is light with the terminal fourth black. Skimmer is of a much lighter hue above—a light sandy gray—with less conspicuous black spots. There is no black about the head, and the under parts are white. The legs, and especially the feet, are darker in color, being more brownish. The bill is partly red, partly brown.

July 29.—When feeding time comes, Samson jumps frantically up and down, and Heron rolls his eyes and climbs toward his spoonful by means of feet, wings and bill. Skimmer grows but little, and still has to be fed by force.

July 30.—None of the young birds seemed to relish their food to-day, so a new diet was prepared. Heretofore the fish (tiny killie-fish) was half boiled, chopped and mixed with ants' eggs. Now a hearty

meal was given to the ever ravenous wood ibises, and two hours later a little judicious teasing persuaded them to disgorge a mass of finely comminuted fish, sweet-smelling and, I hoped, adapted to the digestion of the little terns. I was right, as it proved, for at one feeding they ate more than they had during the entire day.

When frightened the terns now run to the darkest corner, but Skimmer gives several side flicks with his feet, making thus in an instant a little cavity into which he sinks, drops his head close to the sand and—disappears, his back almost flush with the general level of the sand. It is a marvelous bit of instinctive jugglery.

July 31.—Sprawler—who sprawls no more—and Gull fight lustily over bits of fish.

The reason why Skimmer so persistently refuses to accept food is because in his bill—as in that of the adult bird—the sensitive area is confined to



COMMON TERN, 7 DAYS OLD.

the base. The food must be put on or back of the tiny tongue to excite the nerves of swallowing.

Sprawler and Gull now pick up things, and once the former chased a cockroach about. Gull learned to peck by watching Sprawler. The latter picked up a bit of fish, Gull snatched it from him, dropped it, and when Sprawler made another rush at it, Gull picked it up for himself—his first attempt.

Aug. 2.—All the birds are doing finely on wood-bis—pre-digested fish.

Four least terns, three weeks old, were placed in the box. These birds had been weaned to whole fish—very small ones, of course. I offered one about an inch long to Sprawler, who fairly leaped



SEA BIRDS' EGGS IN THE INCUBATOR.

at it and swallowed it without an effort. This explains the fact that for two or three days the terns and gull have acted strangely when they caught sight of the medicine dropper, rushing at it and trying to engulf it. The white, glistening tube evidently awakened an instinct which became evident when an actual minnow appeared. The gaping upward of the terns probably indicates that, for a few days at least, their food consists of regurgitated fish, but the continual pecking, pecking of the skimmer was a mystery until, acting on the hint given by the feeding of the whole fish, I presented one to a newly-hatched skimmer, holding it in the forceps, as his parent might in her queer mandibles. Instantly he reached for it, inserting his thin mandibles between the blades of the forceps, and swallowed the inch-long fish as if it was his twentieth meal instead of his first. So Skimmers are doubtless fed from the first on entire fish. The sharp mandibles of Skimmer only cut the macerated fish in two, but the effect on the solid body of the entire fish showed how little I had understood his wants here-

tofore. After eating three small fish at once, little Skimmer was compelled to crouch on the sand for some time, the weight of his meal not far from that of himself forcing him prone.

Two of the least terns had not yet learned to feed themselves, but they soon learned from Sprawler and Samson.

Aug. 3.—The young birds' menu for to-day was as follows:

Skimmer, 11 fish, 5 feedings.

Sprawler, 11 fish, 5 feedings.

Samson, 10 fish, 5 feedings.

Gull, 16 fish, 5 feedings.

One least tern, 10 fish, 5 feedings.

Aug. 5.—The birds differ much in the way they receive their fish. Skimmer sits still, flutters his wings and reaches forward for it; Gull opens his mouth wide and takes it rather slowly; Sprawler and Samson gape like robins, and dance up and down; while the least terns rush like an arrow, snatch the fish and go to a corner to gulp it down.



SKIMMER HERON, AND TERNS JUST HATCHED

Their impetus and dash seem to hint of the flying plunge with which adult terns secure their food.

Aug. 10.—Birds thriving. Skimmer (18 days

old) still has the white egg tooth on the tip of his upper mandible. Bill measures 13 mm. in height and the under mandible is 2 mm. longer than the upper.

CONCLUSIONS.

A.—The call, food and alarm notes of common terns, black skimmers and laughing gulls are instinctive; not taught by the parents nor learned by imitation. The one *positive* proof of this would warrant the assertion.

B.—The remarkable disparity in the length of

such conditions the terns (which we remember are not so protectively colored as the skimmer), take time to run to the darkest corner or shadow before squatting, while the skimmer crouches instantly, and with two or three instinctive flicks of feet and legs, almost buries himself.

E.—The sight of small but entire fish excites a newly-hatched skimmer much more than does macerated fish. Terns are not so excited until after the first week.

F.—The act of pecking is instinctive to a certain extent, but ~~his~~ acquired very slowly in this way.



PHOTOGRAPH

FEMALE EUROPEAN BISON

E. R. SANBORN

the mandibles in the adult black skimmer is fore-shadowed even in the embryo and in the newly-hatched bird.

C.—My experience with a dozen terns and gulls showed that these individuals prefer fresh water to salt.

D.—There is absolutely no "instinctive" fear of man or other objects which enter quietly into the environment of the young birds, but a sudden shadow or loud noise causes them to perform certain acts—wholly instinctive—which have for their object an escape from supposed danger. Under

By imitation it is learned quickly, and is performed successfully within a few minutes.

G.—The art of flying is wholly instinctive, the terns learning the use of their wings as soon as the primaries are large enough to support them.

EUROPEAN BISON.

For a century or more, the survivors of *Bos bonasus* have existed solely through the iron-clad protection afforded them by the Czar of Russia. For many years it has been only by imperial favor that a zoological garden or museum could procure a specimen. Excepting the few small

bands that still exist on the northern slope of the Caucasus Mountains, the only living European Bison, outside of zoological gardens and private parks, are those that inhabit the forests of Bielowitza and Swisslotsch, in West Russia. In 1857, about 1,898 head were living, but in 1892 the total had decreased to 491. Wherever found, they live in scattered bands of from three to ten individuals.

Late in 1903, by means of a postal card, the Prince of Pless offered to sell to the New York Zoological Society a pair of bison from the small herd inhabiting his forest in Silesia, the extreme southeastern corner of Germany. Through the kindness of Mr. Norman James, of Baltimore, Mr. Charles Sheldon, of New York, and Dr. Leonard C. Sanford, of New Haven, they were immediately purchased. After a long and severe journey, the animals arrived on April 15, very thin and weak, and much bruised on the hindquarters. They were immediately liberated in a very

haired than in our bison. The European Bison never exhibits the luxuriant and picturesque frontlet and mane that form so conspicuous a character of the American species.

So far as we know, the specimens now in the New York Zoological Park are the first to arrive in America; and the acquisition of good examples of a species so rare and difficult to represent may fairly be accounted a stroke of good fortune.

AN ANIMAL FROM THE "ROOF OF THE WORLD."

When adult and in its prime, the Markhor is the largest and handsomest of all the wild goats. Its home is literally on "the roof of the world," in the Himalayas of Kashmir,



PHOTOGRAPH

THE SULEMAN MARKHOR

comfortable corral that had been specially prepared for them at the Buffalo Entrance, and tended with the greatest care.

Ever since their arrival, their condition has steadily improved, and by autumn they should be in fine condition. The dense new coat of slaty-gray hair that is now rapidly replacing the old pelage indicates a satisfactory degree of vitality. As nearly as can be judged, both specimens are about five years old.

The differences between these animals and the American Bison exhibited beside them are noticeable at a glance. The legs are very long, and the body is very short, giving the European Bison the appearance of being much taller than our species. The hair on the head, neck and forequarters is shorter, but the tail is longer, and more heavily

Afghanistan and northwestern India. Judging from the accounts of the very few Englishmen who have successfully hunted Markhor, and afterward written about them, their pursuit is frequently the most dangerous and unfruitful of all mountaineering for sport. It is a common occurrence for the quarry to fall hundreds of feet, and become so badly mutilated as to be entirely worthless. The greater part of the home range of this animal is practically inaccessible to sportsmen, hence the rarity of the Markhor, even in museums.

The Astor Markhor, of northwestern Kashmir, is remarkable for the long and wide backward sweep of its horns, and the 12-inch-long mane beneath its neck. The Suleman straight-horned Markhor (*Capra falconeri jerdoni*), from the Suleman Mountains of northwestern



PHOTOGRAPH

RUSSIAN BROWN BEAR AND CUBS BORN IN THE PARK.

E. R. SANBORN

The photograph shows a characteristic position taken by the mother bear while nursing her young.

India and Kashmir, is noted and highly prized because of the wonderful twisted horns that are set upon its head in the shape of a V. They are like huge screws from two to three feet long, and are earnestly sought for by horn collectors, but usually in vain.

Fortunately, the limitations on Markhor hunting now are strict. The Rajah of Kashmir has forbidden the killing or capture of his animals, and in his territory it is not considered in good form to possess even a pair of horns of recent date, or doubtful pedigree.

Through Mr. William Jamrach, of London, the New York Zoological Society has at last come into possession of a two-year-old male Suleman Markhor, which arrived from India via London on May 28th.

In order to avoid all risks from the grass on Mountain Sheep Hill, the new arrival will be kept for some months in one of the open-air corrals at the south end of the Antelope House. As usual, we advise all persons who wish to see a living animal of this species to take immediate advantage of the present opportunity, for it is a difficult task to bring an animal half way around the world, and successfully transplant it from an elevation of perhaps 14,000 feet to one of 70 feet.

Notes.

We observe with satisfaction that once more an effort is being made to provide Boston with a zoological park. A Massachusetts Zoological Society has been organized, with Dr. C. S. Minot as president, and the Stony Brook Reservation has been chosen as the site. We are assured by the report in the Boston *Transcript* that "The new 'Zoo' will be far more accessible than the Bronx Zoo in New

York, or the Philadelphia zoological park." In view of the use of the nickname "Zoo" in the *Transcript* article, nineteen times over, we respectfully warn the press of Boston that already several good plans that we wot of have been zood to death, and that only the strongest zoological constitution can withstand the perpetual use of a name that means a vivarium of the fourth or fifth class.

We wish the Boston effort long life and prosperity, for the glory of one zoological garden or park is shared by all others.

The acceptance by Dr. Alfred G. Mayer of the directorship of the new marine biological laboratory about to be established on Dry Tortugas Island, Florida Strait, by the Carnegie Institute, means a distinct loss to the Aquarium branch of the New York Zoological Society. Always an earnest and helpful worker in the Society, he was particularly interested in and useful to the Aquarium, where his scientific interest naturally centered. His administration of the Brooklyn Institute Museum was characterized by great intelligence, energy and discretion, and only a golden opportunity for the pursuit of his favorite studies of marine life could have tempted him from the Museum which had prospered so well under his direction.

As a parting gift to the Zoological Society, Dr. Mayer bestowed upon it, unreservedly, the manuscript and illustrations for a popular handbook on the invertebrates of North America. It is the intention of the Society to publish this work at an early date.

ZOOLOGICAL SOCIETY BULLETIN

No. 15

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October, 1904

OUR ASIATIC DEER COLLECTION.

IT must be admitted that in representatives of the Deer Family, Asia far surpasses all other continents. The number of her species (about thirty-eight) is fully double that of any other continental area, and from the Altai Wapiti to the tiny Water Deer, the variations in size and form are fairly bewildering. Sad to say, however, one of the largest and most interesting species, known as Pere David's Milou Deer, has actually become

extinct as to its wild state during the last ten years. About thirty-five living specimens are all that save the species from total extinction.

It is quite certain that a number of desirable species of Asiatic deer can successfully be introduced into the parks and game preserves of America, and induced to breed. From a zoological point of view, the Asiatic deer are animals of real importance, and it is quite time that a good collection of



PHOTOGRAPH

AXIS DEER, FROM INDIA.

E. P. SANBORN

The Park herd now contains thirteen specimens.



PHOTOGRAPH

ASIATIC DEER HOUSE.

E. R. SANBORN

Photographed previous to occupancy by deer. The Prjevalsky Horses, in the foreground, temporarily occupy one corral.

the leading types should be established in America. To this end, the Zoological Society now presents the new Asiatic Deer House, and along with it the following species of Asiatic deer:

Altai Wapiti,	<i>Cervus canadensis asiaticus.</i>
Maral Deer,	<i>Cervus maral.</i>
Barasingha Deer,	<i>Cervus duvauceli.</i>
Axis Deer,	<i>Cervus axis.</i>
Japanese Sika Deer,	<i>Cervus sika.</i>
Indian Sambar Deer,	<i>Cervus unicolor.</i>
Malay Sambar Deer,	<i>Cervus equinus.</i>
Molucca Deer,	<i>Cervus hippelaphus moluccensis.</i>
Hog Deer,	<i>Cervus porcinus.</i>
Chinese Water Deer,	<i>Hydrelophus inermis.</i>

The above species, which are represented by forty-four specimens, illustrate six important groups,—the Red Deer (Maral), Wapiti, Sika, Sambar, the Rucervines and Water Deer. The

Muntjacs, Roes, and Musk Deer must wait until the Small-Deer House has been provided; but meanwhile, our efforts to procure several other large and important species of Asiatic deer will be continued. Unfortunately, the species now most earnestly desired are very expensive; but they breed well, and eventually reduce their cost per head.

The Altai Wapiti, of which we have a fine pair, now in their fourth year, are at present quartered temporarily in the Llama House, and their physical condition leaves nothing to be desired. To all visitors who care for deer, they are a constant source of wonder, because of their well-nigh perfect similarity at all points to our own Wapiti. As a demonstration in geographical migration and separation, our two species of Wapiti constitute a striking object lesson.



PHOTOGRAPH

E. R. SANDORN

ALTAI WAPITI, FROM CENTRAL ASIA.

The Old World counterpart of the American Elk.

The Maral Deer, of the Caucasus Mountains, is merely a big and handsome overstudy of the European red deer,—a midway step between that and the Altai Wapiti. The male looks like a small elk.

The Malay Sambar is one of the most satisfactory deer of all the species we possess. It is large and noteworthy, it is steady-nerved and good-tempered, breeds persistently and grows rapidly. Its antlers are short and thick, and its heavily-haired tail has brought upon it the unfortunate name of "Horse-Tailed Deer." Although thinly haired, it can live through our coldest winters without a fire, provided it is housed in a good barn during the severest weather. In size this species quite surpasses our mule deer, and stands about half way between that species and our elk.

The Axis, or Spotted Deer is the most delightful species in our whole deer collection. While the unfortunate mule deer and the miserable Columbian black-tail droop and die, from slight causes, or no cause at all, and while our white-tailed deer

actually *struggle* to exist on the best food we can possibly offer, the Axis herd goes on breeding and growing, with never a sign of gastro-enteritis,—absolutely free from diseases of every kind. The only concession required by the herd—chiefly on account of the fawns that are born in midwinter—is a cheap coal stove in the center of their barn, to take the chill off the air in the coldest winter weather.

The Japanese Sika deer are hardy, robust, able to endure any degree of cold, and certain breeders. During the rutting season our buck is very savage and dangerous; but that is only an individual trait.

Our two fine pairs of Barasingha, or Swamp Deer, were imported this year, from India, and form an important and welcome addition to the Asiatic collection. In its horn architecture this species strongly suggests our mule deer. In summer the bright tan-colored coat of this animal renders it conspicuous from afar.



PHOTOGRAPH

E. R. SANBORN

MARAL DEER FROM CAUCASUS MOUNTAINS.

An important change has been made in the deer ranges occupying the hill directly west of the Aquatic Birds' House. Until recently the four ranges situated there have been without a shelter house, the ground has been poorly drained, and the fences were imperfect. Last year it was decided to remodel those ranges so as to double their number, build a fine deer barn on the highest and most central point of the hill, and devote the entire installation to large Asiatic deer.

This idea has been carried out, in a thorough and painstaking manner. The result is a fine and spacious deer barn of the most modern type, with eight ranges of ample size. The fences are all new and exhibit all the improvements that our experience has shown to be desirable. For the partition fences, a special post was invented, to carry two wire fences 12 inches apart, to prevent fatal fighting between herd leaders.

The whole surface has been

thoroughly under-drained. Unwholesome grasses have been plowed under, and ample water, sewers and fire protection has been provided. The shade in these ranges is everything that could be desired. The building has been encircled by a generous girle of macadam, and the stone runways along the fences are the best we have yet provided for any of our deer ranges. The gates and posts were made in our own shops, and the building was erected by our own ground-improvement force. Last, but not least in importance, ample walks have been constructed leading to the building; but there is *no* public passage-way through the building.

The herd of Fallow Deer will for the present remain in the range it has occupied heretofore; and at an early date the Altai Wapiti, Barasingha, Indian Sambar, Malay Sambar, Molucca Deer, and Maral Deer will be installed in the new ranges.

W. T. H.



PHOTOGRAPH

E. R. SANBORN

JAPANESE SIKA DEER.
Photographed August, 1904.

THE RUSH OF WORK

THE program of new improvement work for 1904 is the longest for any year since 1899. The present working season has been marked by great activity in all directions, and also unusual strain. At this date conditions are, in brief, about as follows:

The ostrich house will be ready for occupancy about November 1st.

The small mammal house will be ready about November 15th.

The large bird house is about three-fourths complete.

The Asiatic deer barn and its eight new ranges are completed.

The sewer lines, water lines, electric conduits, the net-work of drains and catch basins, and the Telford macadam surface of the south half of Baird Court, are all complete. The entire surface has been coated with tar, to give smoothness.

The wrought-iron fence around the sea lion pool in Baird Court has been erected.

The Alaskan totem pole and house have been erected.

A fifteen-foot concrete walk has been laid in front of the reptile house, from the sea lion pool to the wild turkey enclosure; and from thence on to the fox dens the walk has been rebuilt.

The concrete platform around the Lydig Memorial Arch has been constructed.

Concrete platforms have been laid in the stairways at the polar bear dens and Lydig Arch.

One-third of the service road has been resurfaced.

An adequate water supply has been provided for the nursery and its buildings.

The burrowing rodents' enclosures have all been floored with concrete, and new wire is being erected for the whole structure.

The rebuilding of the walks at the bear dens, wolf and fox dens is in progress.

An important addition to the Chief Clerk's office has been built.

Bids for the new pheasant aviary are now being considered by the Park Department.

The rebuilding of the remainder of the walks that were built in 1899 will be accomplished at an early date.

A large section of the rough retaining wall required for the east side of Baird Court has been built.

Stone has been hauled in for the construction of a walk from the southwest corner of the fox dens, along the elk range and llama house, to the southwest entrance.

The yards for the ostrich house are now under construction, by our own force.

The walks around the ostrich house and small mammal house will be constructed immediately, by our own force; and the walk along their west front will be rebuilt, from end to end.

A camel's house will be erected forthwith, near the southwest entrance, by our own force; and also a small rustic shelter house in the mouflon range.

Whether it is within the bounds of possibility to complete all the above before cold weather, remains to be seen.

A VARIETY OF FEATHERED FOLK IN THE ZOOLOGICAL PARK

By C. WILLIAM BEEBE

N. Y. Tribune, July, 1904.

WITHIN the bounds of the Zoological Park are included some two hundred and seventy acres, part of which is in a wild, wooded condition, while much is given up to the collection of animals and birds. The wild feathered creatures, seeing the contentment of the captive birds in their ample cages and ranges, respond at once. It is as if they said, "Go to, our brethren are safe and happy. This is the best home for us, near them," and thereupon they choose mates and make their home within the protection of the park's wire boundary.

With the help of a friend, a true lover of birds, I have

made as complete a census as possible, not of the birds which we shot during the summer, nor of the nests and eggs which we collected, for we did neither; but a list of the wild birds which build their nests and successfully rear their young in the Zoological Park. Our list numbers exactly sixty-two species of birds—a remarkable number to be found breeding within the limits of so small an area, and especially as it is in New York City itself. This shows what protection will accomplish, while many other places of equal area near by are tenanted by a scant dozen species of birds.

Let us see what a walk in late June, or especially in July,

will show of interesting young birds. The wild wood ducks frequently decoy to the flocks of pinioned birds, and occasionally mate with one of them. This year a wild duck mated with one in the park, and would not desert the brood even when the little downy birds were being caught and pinioned. Such devotion is rare indeed. In the top of one of the most inaccessible trees in the park a pair of black crowned night herons have built their rough nest of sticks for several years, and from the pale green eggs hatch the most awkward of nestlings, which nevertheless flourish on a diet of small fish. When they are able to fly they pay frequent visits to their friends in the great flying cage, perching on the top and gazing with longing at the abundant feasts of fish which the birds inside are enjoying. This is the only duck and heron thus to honor the park, although many other species are common at the time of the migrations.

Of the birds which in the spring and fall teeter along the edge of the Bronx River, a pair or two of spotted sandpipers remain throughout the summer, content to lay their eggs in some retired place where there is little danger to them or to the fluffy balls of long legged down which later emerge. Formerly the red tailed hawk and the great horned owl nested in the park, but of late they have retreated to more isolated places, and of their families there remain only the sparrow hawk, and the little screech owl. The former is a most valuable bird if people only knew it, as most of his food hereabouts consists of English sparrows and starlings.

When a dainty little pair of sparrow-hawks elect to build their nests under the eaves of a house they should be encouraged to the utmost. These and the much shyer shrikes are our only hope in keeping down the number of the foreign intruders. In the park the hawks nest in a hollow tree, and the screech owls, which, too, should be unmolested, also lay their white eggs in a tree. When the hawks cease their good work at dusk, the screech owl looks out from his retreat, quavers his little song and launches out to hunt down the troublesome mice and rats; and so the two birds divide the twenty-four hours between them in doing good deeds for mankind, and yet both are persecuted almost wherever found.

Then there are the black and the yellow billed cuckoos, valuable birds both, ridding the trees of thousands of fuzzy caterpillars. Their nest is a frail platform of twigs, and their light blue eggs are always two in number. The belted kingfisher bores into the bank of the river, and in the dark chamber at the end, raises a family of six or eight. Young cuckoos and kingfishers are the funniest of all young birds. Instead of their plumage coming out a little at a time, the quill sheaths grow unbroken into long and slender structures, and the little birds look as if clothed in an armor of bluish sticks, one row overlapping the next like the tiles on a roof.

Two woodpeckers make the park their home, the little black and white downy, and the well known flicker or "high-holder." Both, of course, nest in holes in trees, homes dark and full of splinters, but infinitely more cheerful than the sooty chimneys where the young chimney swifts first open their eyes, twitter and are happy until they can spread their marvellous sicklelike wings and fly all day. They hatch from eggs as white as they themselves are dingy brown, and their nest is a mosaic of twigs glued to each other and to the bricks of the chimney by their mother's saliva.

Who would ever think that the dainty little ruby throated humming bird is a near relative of the stubby billed swift?

And yet, if we look into the hummer's nest in the Zoological Park when the young birds are just hatched, instead of the long needlelike bills of the parents, the nestlings will be seen to have short, broad beaks very much like those of the swift. There is small danger of the humming bird's nest being disturbed—a tiny bunch of plant down, tied firmly with strands of cobweb and covered with lichens, exactly like a hundred of the stubby knots on any tree.

Five species of flycatchers are represented; the least flycatcher, wood pewee, phoebe, crested flycatcher and kingbird. The first two prefer the deep woods, the third a bridge beam, the fourth a hollow tree and a door mat of snakeskin, the fifth an apple tree. The American crow, of course, is found in this little world of birds, and a rare cousin of his, a smaller copy of himself, the fish crow, also nests here. A single pair of bluejays nest in the park, but the English starling occupies every box which is put up. This is a handsome bird and a fine whistler, but when we realize how surely he is elbowing our native birds out of their rights his beauties vanish and we perceive he is as much of a villain as the English sparrow. Our beautiful purple grackle and meadow lark and redwinged blackbird; the orioles, both Baltimore and orchard, rear their young in safety here, while the cowbird imposes on many of the smaller species.

The indigo bunting, rose breasted grosbeak, cardinal and scarlet tanager form a quartet of beauty of which any locality may well be proud, and among the more sombre hued seed eaters we find the towhee, swamp, song, field, and chipping sparrows, and, unfortunately, though as a matter of course, passer domesticus, which only wholesale and systematic shooting has prevented from overrunning the whole park. The bank and barn swallows all through the summer skim over field and pond and nest in the places from which they have taken their names. And the rough-winged swallows also make the park their home. Four vireos hang their dainty pensile nests in the Zoological Park, the white eyed, red eyed, warbling and yellow throated; and of the typically American family of warblers we number the redstart, chat, Maryland yellow throat, oven bird, yellow, blue winged Lawrence and black-and-white warblers.

The house and Carolina wrens lead their numerous progeny about the park, levying heavily on injurious insects and "bugs." The catbirds and robins are among the most abundant breeders, while young chickadees and white breasted nuthatches are less often seen attended by their parents. The bluebird haunts the hollow apple trees, and of the last family of birds, the thrushes, the veery, or Wilson, and the incomparable wood thrush sing while their mates cover their treasures closely with their warm breasts.

IMPORTANT NOTICE.

Large palms and foliage plants are greatly needed, for decorative purposes, at the New York Zoological Park and the New York Aquarium. Members of the Society and their friends, having such plants, now grown too large for their conservatories, are earnestly requested to present them for use in the Park and Aquarium. The Secretary's office will send a representative to properly arrange the acceptance of each gift and its transportation.



Zoological Notes.

Early in the year, homes were provided the wild birds which might need them, in the shape of small boxes, nailed in the trees. These were promptly occupied by starlings, and during the summer three broods were raised. As soon as the last family of young birds was able to fly, the boxes were vacated. Then the gray squirrels, seeing splendid possibilities, immediately took possession, and commenced preparations for winter. But their expectations were short-lived, for they have been evicted by the red squirrels, who are storing up quantities of acorns and chestnuts, and bid fair to remain in possession. Particular significance may be attached to the fact, that the starling rears three broods in one season, as it demonstrates the possibility of its becoming a greater nuisance than the English sparrow. Last year a special effort was made to "colonize" a pair of black squirrels in the large oak trees near the Service Building. The animals finally established themselves about as was desired, withstood the severe winter successfully, and have reared an interesting family.

During the year 1903, efforts were made to rear terns and skimmers, but with indifferent results. This summer, twenty terns and six skimmers have been hatched, and are developing into strong birds. Although their enclosure is narrow and the pool small, the young skimmers already try their characteristic flight of sailing close to the water, a feat which they have learned quite by instinct, as there are no adult birds to teach them.

A spectacle owl from South America, has been added to the Bird-House collections. It is snowy white, with a circle of dark feathers around the eyes, giving the appearance of a pair of spectacles. Specimens of this species are very rare, and this is the first to reach the Zoological Park.

The mammal collection has been enriched by the addition of three sloths, representing both the three-toed and two-toed species. The two-toed species is represented by a mother and her young. The little fellow is about ten inches in length, and has a fully developed coat of hair. Both the adult animals feed well, which is more than could be said of the sloths we have previously exhibited. The mother and young are lively—for sloths—and vigorous, and there seems to be no reason why they should not thrive.

A pair of cockateels which Mr. Beebe kept out of doors last winter, survived the rigors of our severe climate so well that the same experiment will be tried again. In the spring, the birds were in much finer condition than any of the others which had been carefully sheltered.

Although the sandhill cranes have long passed the nesting season, they still defend their old nest with a vigor which excites admiration. Both birds spend their time close to the nesting site, and probably will again select it as their nesting place. Two eggs were produced this spring, but proved to be infertile. As it was the first time these birds had mated, and the occurrence is so rare in captivity, it is to be hoped that young birds will be forthcoming next year.

A rattlesnake from South America, is the latest addition to the Reptile House. The general tint of the snake is a light gray, and the typical markings of the diamond-back and banded rattlers are scarcely discernible. This specimen was found on the western slope of the Andes.

Two hundred and seventy-three specimens of the snakes common to western New York were recently presented to the Park by Messrs. Morris Pearsall and Adam Dove. The collection contained a number of adult banded rattlesnakes, presenting different color phases, and also a large number of young snakes. Some of the latter were born on the collecting ground, and others in the Reptile House. For the young ones, an enclosure has been made in the east end of the Reptile House, where they can have an abundance of light, and a temperature suitable to their requirements. Although the snakes are but a few weeks old, they are feeding well, and apparently will thrive and grow.

An interesting experiment is being attempted with the plot of ground directly east of Mountain Sheep Hill. An irregular space bounded by the Buffalo Range, Mountain Sheep Hill, and the Service Road, is being enclosed by a very low wire fence. This space includes two small ponds, a spacious grass plot, and a number of clumps of small bushes. Into it will be placed a number of turtles and tortoises with the hope that they will breed. One pond will be entirely devoted to the Florida soft-shell turtles, and the other to the common varieties, and terrapin. They will be liberated this fall, in order to give them ample time to seek winter quarters in the earth, and in the mud at the bottom of the ponds.

The Burrowing Rodents' Quarters are being repaired and renovated. The old wire work has been removed and replaced with new material. The earth and rock sleeping dens have been entirely removed, pending the laying of good concrete floors with catch-basins, when they will be rebuilt. The new arrangement will render it impossible for the animals to hide so persistently as heretofore, rats will be entirely eliminated, and it will be possible to open up and inspect the animals' sleeping dens.

The temper of the small puma at the Lion House corresponds very closely to that of the domestic cat. In fact, she is really affectionate. When her keepers enter the cage in the morning she comes up to them fearlessly, rubs against them, and demonstrates that she wishes to be friendly. The male puma, on the contrary, is exceedingly vicious.

The greatest difficulty was experienced this year in capturing the birds in the Flying Cage, preparatory to putting them into winter quarters. Mr. Beebe declares that at no time since the first season that the cage was used have the birds been so vigorous and active, and so difficult to catch without injury.

The largest giraffe, the male, has grown over six inches in height since October 17, 1903, the date of the arrival of the pair in the Park. The general condition of all the stock in the Antelope House is all that could be desired. A female Baker's roan antelope has been put with the male, and there is also a second Markhor. Both the latter animals have endured our humid summer exceedingly well, and considering the high altitudes in which they live, they should endure our winters without loss of health.

E. R. S.

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EDITED BY THE DIRECTOR

Elwin R. Sanborn, Asst. Editor.

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TEASING WITH FOOD.

Not long since we saw in the pages of an esteemed contemporary, an article of length and polish on the subject of "Bear Beggars." In it the author, who is of the medical fraternity, seriously set forth both fact and argument in favor of the practice which prevails in the London Zoo, of permitting and encouraging visitors to feed the bears, and other animals.

The argument in favor of feeding by visitors was based on the amusement and entertainment furnished to the bears, and the joys of perpetual expectancy. The climax of the article was reached in the following words:

"In the New York Zoo the bears have allotted to them much larger space than their cousins in London. But

visitors to the New York Zoo are not allowed to feed the animals. From morning to night there is nothing very interesting to break the monotony of their captivity—except the stated feeding times. From morning to night, in the London Zoo, the bears are busy eating or are begging for food, so there is something for them to look forward to every day. While they have a few feet less space for their exercise and amusement, it is a question whether or not they do not have a happier captivity than the bears of the New York Zoo. Certainly they are healthy and strong. I believe that if a vote could be taken among the bears themselves, they would decide unanimously for less space, with begging and feeding privileges, as against more space and no outside feeding or begging privileges allowed. Sometimes, perhaps, the visitors to the bear pits in the New York Zoological Park will be allowed to feed the bears. It will then be the captive bruin's paradise."

And this from an M. D.! This, in spite of the presence here of thirty-three of the jolliest, happiest and best-behaved bears in existence, wild or captive, with at least twenty times the space available per bear in London! This in spite of bears who are as frolicsome and lively as a band of schoolboys in a swimming-hole, or on a playground. This in spite of the fact that because our bears are not teased and irritated all day long by petty offerings of food from the hands of visitors there is very little bad temper, very little fighting, and the keepers can go without fear amongst big and powerful bears of all nations.

And this, too, in spite of the fact that our fine Himalayan Black Bear, "Jappie," was foully murdered by some unwise visitor who slyly administered unto him four peaches, with the stones in them.

I know of no way by which our happy family of bears could so easily or so surely be ruined in temper, rendered thoroughly savage and dangerous, and kept fighting half the time as by giving visitors permission to feed them at their pleasure. To advocate the feeding of captive animals by visitors is to advance a proposition which if carried into effect yields cruelty to animals, no more, no less.

W. T. H.

THE MORAYS AT THE AQUARIUM.

"Dr. Theodore Gill, of the Smithsonian Institution, one of the most accomplished ichthyologists in the world, contributes the following

notes respecting the morays living in the New York Aquarium:

"I was very much interested in observing the attitudes and postures of many of the fishes in the New York Aquarium; most of all, those of the moray or muraenids. The movements of members of this genus are very characteristic—probably for the family, however, rather than the genus.

"Lying on the ground, preferably on rocky ground or between rocks, they assume a position conformable to their environment. The head is more or less upraised from the ground, and the dorsal, and often anal, fins erect from the front backwards. Rhythmically the mouth is opened and completely closed, and in inverse sequence, the branchial apertures are opened and closed. With the opening of the mouth the apertures are closed; and when the mouth is fully opened, the skin around the apertures is sucked in, as it were. With the closure of the mouth, the expansion of the apertures into circular foramina coincides. In the movements there is a ludicrous suggestion to some of the slow-moving, automatic toys of children.

"Such are the movements of expiration and inspiration most frequently manifested. Sometimes, however, the movements are not so decided, and the lower jaw is only slightly moved up and down; but the foramina are operated nearly, if not quite, as much as in other cases. The mouth, however, may sometimes be left open, and the jaws not moved for some time.

"A rarer posture is assumed by coiling the body around in a snake-like manner. Mr. DeNyse has observed them, not infrequently, in such an attitude. The coil is a loose one, with the head central, and from this coil the head may be slowly upraised while the animal leisurely looks around. The entire action resembles that of a snake; and the fish is a fish in the guise of a snake.

"This attitude, though rare in the typical morays, is often assumed by the *Channomuraena*, and the apparent elasticity of that fish is truly remarkable. It gives one the impression (but a false one) that it can lengthen and shorten itself at will. It does, however, dilate the branchial region.

"Occasionally they are disposed to inflate somewhat the branchial region, and I was told by Mr. DeNyse, that in fighting it was always their habit to dilate it to the utmost. On such occasions they would throw themselves around each other, forming an inseparable pair, and the chief efforts made were to bite each other. These attempts were not often successful, but if one succeeded, the other would at once retreat."

NESTING OF THE LAWRENCE WARBLER.

Many birds in the collection of the Society have laid eggs and reared their young, and in addition, sixty-two species of wild birds have nested within the limits of the Zoological Park during the last three years. The rarest of all these nests is a little cup of oak leaves lined with strips of soft cedar bark which was built on the ground in the center of a tangle of cat-brier near one of the Park buildings.*

When I first saw the nest, it was almost concealed by six hungry mouths stretched eagerly upward, supported on six scraggy necks. The young birds were just feathering out, and they filled their little home to overflowing. Soon the mother—a dainty Blue-Winged Warbler—came, and upon

seeing us uttered a sharp "chip," which sent every nestling crouching to the bottom of the nest. In a moment she flew down and gave to one of them a large, wriggling, green cut-worm.

This was not an unusual sight. Indeed, within a radius of a few yards there were two or three other similar nests, to the small occupants of which, other Blue-Winged Warblers mothers came frequently with food. But the father of this brood was different from his mate. Instead of the yellow throat, he was adorned with a shining jet-black gorget, proclaiming him a beautiful Lawrence Warbler.

He, too, fed one of the young birds and flew away, wiping his bill carelessly before he took wing, all unconscious of our breathless delight. But twelve of his kind have ever been seen by ornithologists, and what his mate, his nest and his brood were like, heretofore no one could say.

The young birds left the nest on June 16th and four of them were seen a week later, still accompanied by their father, the incomparable Lawrence Warbler.

It has been thought that this black-throated, yellow-bodied bird is a hybrid between two species, the Blue-Winged and the Golden-Winged Warblers. In this instance the female was certainly a typical Blue-Wing. If not a hybrid, may it not be a species in the process of formation? Such definite, radical variations are not at all uncommon among plants, birds and the smaller animals.

The song of this Lawrence Warbler was a simple drawing trill, *shree-e-e*, *zwee-e-e-e*, and the interesting point about this is that the *shree* is the song of the Golden-Winged species, while the *zwee* is the utterance of the Blue-Wing. So if indeed he was a hybrid, his song perhaps reflected equally the characteristics of both parents.

At any rate, he was allowed to rear his young and depart in peace, and next year if he escapes the sparrow hawks and shrieks of Mexico during his southern migration, he may return and again make the Park his home. Then perhaps we may hope for a solution of his tangled relationships.

The scientific names of the three warblers mentioned are as follows:

Blue-Winged	—	<i>Helminthophila pinus</i> .
Lawrence	—	<i>lawrenciei</i> .
Golden-Winged	—	<i>chrysoptera</i> .

C. W. B.

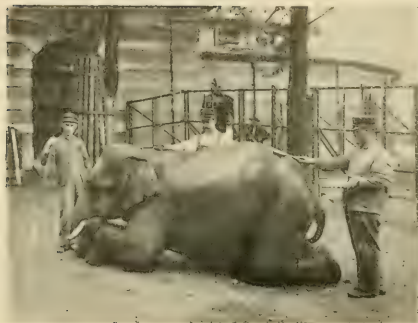
FEEES FOR MEMBERSHIP.

The fees for membership in the New York Zoological Society are as follows:

Annual membership	\$ 10.00
Life membership	200.00
Patron's fee	1,000.00
Founder's fee	5,000.00
Benefactor's fee	25,000.00

Information and blank forms for membership may be obtained at the Service Building, at all entrances to the Zoological Park, and at the Secretary's Office, No. 11 Wall Street, New York City.

* The nest was first discovered by Dr. Wm. Wiegmann, a member of the Zoological Society.



PHOTOGRAPHS.

OILING THE SKIN TO PREVENT CRACKING



E. R. SANBORN.

WASHING DOWN WITH THE HOSE.

OUR FIRST ELEPHANT.

AFTER various delays and disappointments, the Zoological Society has received, as a gift from Col. Oliver H. Payne, a satisfactory Indian elephant. More than a year ago an order for elephants was placed with Mr. Hagenbeck, calling for an African elephant of any size obtainable, and a male Indian elephant not less than seven feet in height.

A baby elephant that was captured for us in German Eastern Africa died in the wilds, and at present there is no other in sight. The first Indian elephant purchased by Mr. Hagenbeck's agent in India so endeared himself to his native owner that at the last moment the price was doubled,—and the purchase declared off. Another elephant was found, and its transfer agreed upon; but at the last moment it developed a bad temper, and had to be abandoned. Thereupon "Gunda" was purchased.

"Gunda" is from Assam, in the extreme north-eastern corner of India. He was caught wild, is now about seven years old, and stands 6 feet 7 inches high at the shoulders. He has all the points of a "high-caste" elephant, and weighs 3,740 pounds,—a heavy weight for an elephant of Gunda's age.

This elephant was shipped from India in a massive box, in charge of Kodah Bux, the laziest and most shiftless native who ever left India's coral strand. Kodah came to stay for three

months, and was to spend his time in caring for and training this elephant. But by no process known in the Zoological Park could he be coaxed or coerced into doing anything resembling duty; so he was promptly shipped back to India.

Keeper Frank Gleason asked for "Gunda," as his special charge, to train, handle, and care for; and to him the elephant was assigned, within a week after its arrival.

"Gunda" is a good elephant, and on Sunday, August 14th, began his regular work of carrying visitors. Keeper Gleason has trained him very successfully, and without the slightest trouble. But "Gunda" is as mischievous as any bad boy. When unchained and turned loose in his big room in the Antelope House, he began to amuse himself by ascertaining what he could bend or break. Having tusks about 16 inches long, he set to work indenting his doors, springing bolts, and testing the strength of everything within reach.

Wherever there existed a weak spot in his environment, he promptly pointed it out; and our workmen have spent several days in making everything sufficiently strong to meet "Gunda's" requirements.

In captivity, male elephants are much less common than females. In the hurly-burly of travelling-show life, male elephants are prone to resent the worriments that are common to all. The females are more patient and obedient under adverse circumstances, and therefore more desired. In the



ENTRANCE TO AQUARIUM AT HONOLULU.

NEW AQUARIUMS.

THE public aquarium is a rare institution in the United States, and the opening of a new one is a noteworthy event. A fine temporary aquarium is now maintained at the St. Louis Exposition, by the United States Fisheries Bureau. The building was constructed especially for use as an aquarium, and while not large, it is pronounced one of the best architectural features of the Exposition. Its collections are admirable. There are thirty-five wall tanks, and a large central pool, containing fishes from various parts of North America. The food and game fishes are especially well represented, and there are a number of tropical forms, from the Bermuda Islands.

This aquarium, like others maintained by the United States Government at previous American expositions, is always crowded with visitors. It would be safe to say that at each of these great fairs, the aquarium has been the most congested spot, requiring special attendants to keep the crowds moving. Aquariums are expensive institutions to operate, and require the most careful management to make them successful, but there has never been any doubt regarding their great popularity with the masses.

Undoubtedly, the world's best collection of tropical fishes is now to be seen in the new aquarium at Honolulu. This institution was opened to the public in March of the present year. Its thirty-six exhibition tanks are devoted entirely to the brilliantly colored fishes of the coral reefs surrounding Hawaii. Although Honolulu is not a large city, the attendance of visitors averages about six thousand a month, notwithstanding the admission fee that is charged. At present the building contains about five hundred specimens, representing over one hundred species. A New Yorker who recently visited this aquarium was greatly impressed with the wonderful variety, both in color and form, of the species exhibited there.

The new Detroit Aquarium is located in Belle Isle Park, and is a great delight to the people of the city. It has forty-four tanks, most of which are already stocked.

Information has just been received to the effect that the heirs of the late Lloyd Tevis propose to erect a great aquarium in Golden Gate Park, San Francisco, at a cost of \$4,000,000, and that an architect is now preparing plans. As the ideal aquarium has not yet been built, it would seem



EAST FRONT - AQUARIUM BLDG.

DETROIT AQUARIUM.

that San Francisco is to have it, provided the Tevis fortune is available for the purpose, and care is exercised in procuring the services of well-trained aquarists.

C. H. T.

QUARANTINE AND DISINFECTION.

NEXT to the problems connected with the procurement of a suitable, wholesome and hygienic food supply for the various types of wild animals, and the necessity for providing suitable sanitary buildings for those species which must necessarily be confined within doors for the greater part of the year, there are two other elements which contribute greatly to the general health and vigor of our animals. These are the systems of quarantine and disinfection.

Our past experience has shown that in order to successfully combat diseases, especially those of a contagious nature, a most complete and efficient quarantine system is absolutely necessary.

The invasion of a contagious malady is dangerous in proportion to its capacity to elude observation, and make good its attack. Too great faith can not be placed in port inspection for the detection of contagious diseases. It is practically impossible for any inspector to detect disease in a latent form, or to discover whether apparently healthy animals have been in contact with those which were sick. Moreover, it is a practical impossibility to obtain even a good view of an animal which is boxed for a long journey, and the first place in which real inspection is possible is the quarantine quarters.

A grave form of disease may be introduced by apparently mild or trivial cases. With animals arriving daily from different parts of the globe, great care must be exercised in guarding against the introduction of a possibly diseased animal into

a collection known to be healthy. To meet this contingency we have established a system of quarantine, whereby new arrivals are isolated for a short period, and carefully observed before being placed on exhibition. The results are excellent.

The value of this system has been many times demonstrated by animals which have died within a few days of their arrival, the autopsies revealing highly contagious disorders which would no doubt have been very disastrous and far-reaching, if introduced into cages of healthy animals. In some instances it has been found practicable to place newly arrived animals on exhibition at once in isolated corrals or cages, but an animal is never placed in an enclosure or cage with healthy animals until we are reasonably sure that the new arrival is perfectly healthy. The fact that there has not been a single case of contagious or communicable disease introduced among our animals from without during the past year speaks well for the value of a quarantine system.

Probably every fatal contagious or infectious disease that affects domestic or wild animals is caused by a specific micro-organism that in each case has a life history of its own, and all measures for the prevention and restriction of such diseases must be based on the characteristics of each particular parasite. In the management of all communicable diseases among Park animals, the lines of action follow the well-defined rules of sanitary science, and we have obtained the most satisfactory results.

Disinfection as a preventive of disease plays no insignificant part in the medical work of the Park.

In addition to powerful disinfectants and deodorizers, there are several natural sanitary agents of great importance as destroyers of virus. These are cleanliness, ventilation, drying and sunshine.

Nearly all virus, excepting such as may live in the soil, is killed sooner or later by drying and sunshine, and the importance of these factors in the daily life of our animals can not be exaggerated.

All sanitary measures which contribute to the healthfulness of our animal surroundings are directly or indirectly antagonistic to disease germs, while all carelessness in the keeping of animals may be regarded as an ally of these destructive organisms.

These matters regarding sanitation, ventilation and sunlight were matters of first consideration in

the planning of all the Zoological Park buildings. The almost total absence of disagreeable odors which visitors to zoological collections usually associate with monkey and lion houses is frequently commented upon.

The frequent and thorough disinfection of buildings, dens and cages, whether there have been contagious diseases or not, has, in my opinion, been a great factor in keeping the Park free from anything like an epidemic. External vigilance is the price of the rare and valuable specimens exhibited in the New York Zoological Park.

W. R. B.



PHOTOGRAPH

E. R. SANBORN

YOUNG FLAMINGOES.

YOUNG FLAMINGOES.

A NOTEWORTHY addition to the bird collections in the Park is a flock of young American Flamingoes (*Phoenicopterus ruber*) about two months old. These were brought from the rookery in the Bahama Islands and are the first young birds ever reared in the United States in captivity. They have the habits and actions of the old birds, but their bills are only slightly bent. In the adults the mandibles are curved almost at a right angle. When Flamingoes are first hatched they are clad in a plumage of the softest and whitest down, and their bills are perfectly straight.

This flock of birds is now in the second plumage, a uniform gray throughout. On the breast and the larger wing-

feathers traces of scarlet are just beginning to appear. The birds are well and strong, and are always hungry. Their food consists of dried shrimps, bread and boiled rice.

These birds are all the more interesting when we consider how rare they are becoming. Years ago hundreds of them, forming great scarlet clouds, lived and bred among the Florida Keys, but all have been killed, and there will probably never be another wild Flamingo in the United States. The rookery in the Bahamas is their last stronghold, and even in this isolated place their days are doubtless few.

It is hoped that these hardy young birds may breed in the Park, and become one of the most interesting exhibits of the Society

C. W. B.



INDIAN ADJUTANT.

THE INDIAN ADJUTANT.

THIS great stork derives its common name "from its comical resemblance to a human figure in a stiff dress, pacing slowly on a parade ground."

Two lusty individuals have recently been added to the collection, and by their size and remarkable appearance attract a good deal of attention. Their thick-set bodies, roofed over with the great folded wings, might well become a vulture; but beneath, there protrudes a pair of long legs, while an absurdly emaciated neck rises from a ruff above the wings. This bare, yellowish neck terminates in a rather ill-shaped head, pink and whitish, which in turn merges into an enormous beak.

The head and neck are almost bare, save for a sprinkling of curly chestnut feathers, which have lost all resemblance to ordinary plumage, and cluster in wavy ringlets like fine hair. At the front of the neck is a small protuberance, the be-

ginning of the long pouch, which will develop later on. Pale glassy eyes look out upon the world with a stony gaze. Such is an Indian Adjutant.

Like a vulture or wood ibis, the Adjutant is seen to the best advantage when on the wing, and also like the former bird, it is a valuable scavenger in its native country, India. Its services are thoroughly appreciated, and everywhere it is accorded the protection it deserves, flying familiarly into the very streets of the native villages, where it devours all refuse flesh. It also feeds upon frogs and fish.

Hidden away beneath its tail are many feathers, perhaps the softest and most beautiful in the world,—the much-valued "Marabou plumes," so called. a strange source for such delicate feathers.

C. W. B.



Aquarium Notes

BY making exchanges of specimens with the aquarium at the St. Louis Exposition, the New York Aquarium has secured a number of interesting fishes and turtles from the Mississippi River. There are several species in the collection, which hitherto have not been seen in New York, alive.

It is to be regretted that the paddle-fishes secured did not long survive the journey. This species is specially interesting on account of the remarkable paddle-like extension of the upper jaw, which sometimes reaches a length of 16 inches. It is a delicate species, and has never lived long in captivity, even under the best circumstances. Among the species in this collection, new to the Aquarium, may be mentioned the short-nosed gar, the quillback and buffalo-fish, the last being one of the important food fishes of the Mississippi basin, and often attaining a large size. Some of the other species received were the long-nosed gar, spotted catfish, yellow catfish, fresh-water drum, white bass, sauger



PHOTOGRAPH

GIRAFFE FEEDING FROM THE GROUND.

E. J. SANBORN

This photograph was taken to show the difficulty the animal experiences in accomplishing its object, and the awkward position assumed.

and crappie. The fishes were transported in one of the special cars of the United States Fisheries Bureau, without expense to the Aquarium.

* * *

The annual summer shipments from the Bermuda Islands have been received, and include such brilliantly colored tropical fishes as the blue parrot-fish, green parrot-fish, queen trigger-fish, butterfly-fish, angel-fish, four-eyed fish, mud parrot-fish, cowfish, trunk-fish, squirrel-fish, surgeon-fish, blue tang, trigger-fish, coney, hogfish, spotted moray, tiger rockfish, lady-fish, sergeant major, red hind, striped grunt, large grouper and Bermuda lobster. There is one young jew-fish, weighing about thirty pounds—the first of its kind received. This species is the largest of food fishes, sometimes reaching a weight of four or five hundred pounds.

* * *

At the present time, the Aquarium contains probably a greater number and variety of species than at any other time in its history, all exhibition space being fully occupied. A considerable portion of the collection has overflowed into the reserve tanks in the rear. So far as the present aqua-

rium building is concerned, the collection has reached its limit. The Director reports that he could easily fill three buildings like the present one, without duplication of species, and without materially increasing the cost of collecting specimens.

* * *

Accommodation for the increasing collection of turtles at the Aquarium has been secured by placing eight aquarium tanks, each three feet long, on the main floor near the central pool. This arrangement gives a better view of the smaller species of turtles than has hitherto been practicable. A series of ten small aquaria have been located on the stone coping of the large central pool, to accommodate the collection of crabs and other small crustacea.

* * *

Another exchange, just effected with the new aquarium at Detroit, Michigan, has brought to the New York Aquarium about fifty fishes from Lake Erie. The most important in this lot are the lake sturgeon, and the whitefish.

* * *

Five specimens of the Harbor Seal were procured from Boothbay, Maine.

C. H. T.

ZOOLOGICAL SOCIETY BULLETIN

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January, 1905

THE OSTRICH HOUSE

OF zoological gardens, the world over, there are really very few which indulge in the luxury of a spacious building wholly devoted to the ostriches, rheas, emeus, and cassowaries. Usually these birds are divided between three or four very small structures, and thereby the effect attainable by one grand group is lost.

Really, it seems a pity for any great vivarium not to make an opportunity to exhibit under one roof such a collection as our new Ostrich House will very shortly contain, or indeed such as it contains to-day. The members of the Order *Ratitæ*—the Ostriches and their allies—are so grand, so picturesque, and of such pronounced exhibition value



INTERIOR OF THE NEW OSTRICH HOUSE.



A CAGE IN THE OSTRICH HOUSE.

that they are most desirable birds. They are not only very odd and showy, even from afar, but they are easy to keep, they live satisfactorily (when properly housed and protected from visitors), and it does not cost a small fortune to fill a building. Considering their exhibition value, the birds of this Order are purchasable at very reasonable prices. Individual values range all the way from \$100 to \$250, and a really fine collection can be secured by the expenditure of about \$3,000.

It is the fault of the English language that it is necessary to call this building the Ostrich House—a one-sided designation for a structure half filled with emeus and cassowaries. The only reason for not naming it the Ratite House is that no one would understand the meaning of the name. It

is now a very common thing for English-speaking naturalists to find their language so poverty-stricken in adjectives and nouns that no English names can be found for new species of living creatures.

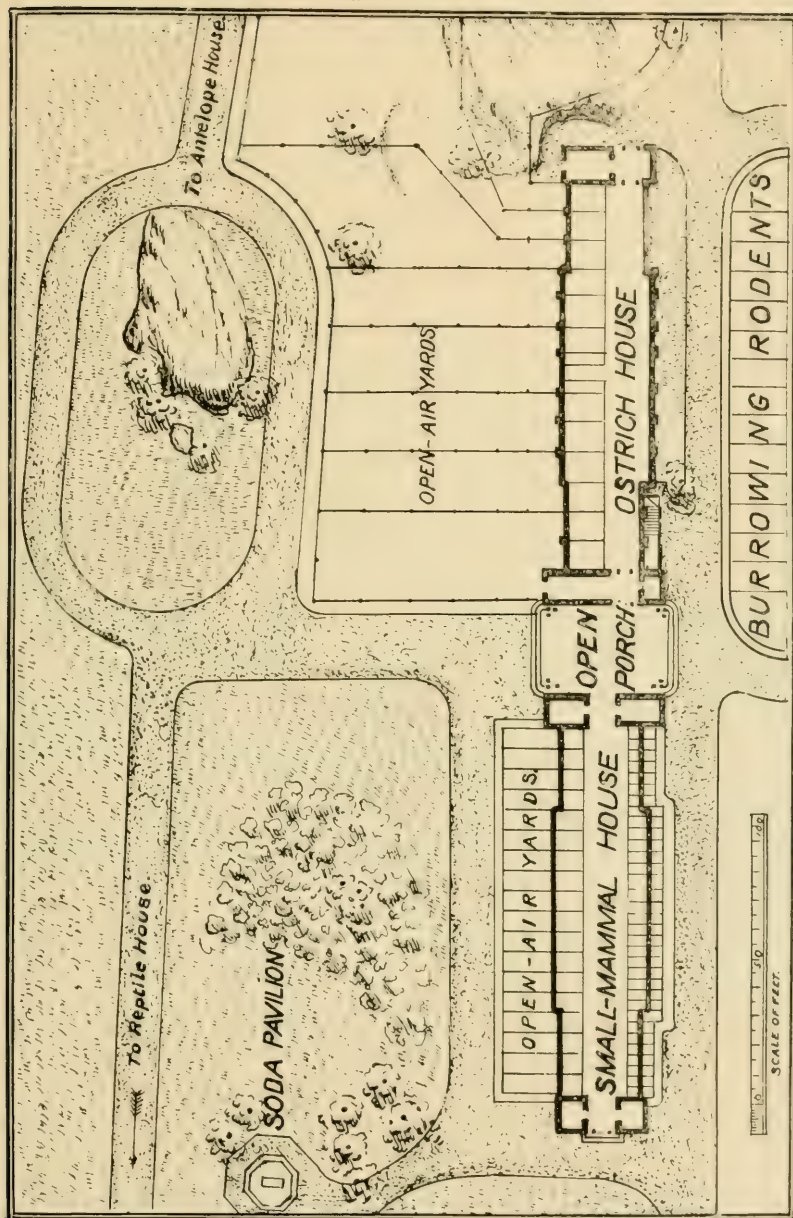
Architecturally, the Ostrich House is a counterpart of the Small-Mammal House. The two are connected by a spacious open pavilion, with a concrete floor, and they are heated by the same furnaces. Having no cages along its western side, either within or without, the Ostrich House has a more pleasing exterior than the other. Within, also, the spacious series of windows looking westward render the interior more cheerful and pleasant than the interior of the Mammal House.

The interior cages extend along the eastern side of this building. They have a depth of twelve feet, and the unit width of each is ten feet. In anticipation, however, of quarrelsome individuals requiring solitary confinement, six movable partitions have

been erected in six of the standard-size cages, so that as seen to-day the equipment consists of six large cages and fourteen that are half size.

The cage-work is eight feet high, and in front it consists of electrically welded netting, the meshes of which are two by four inches. In each cage there is a porcelain-lined drinking-basin, which is filled and emptied by valves in the keepers' passage, behind the guard-rail.

Like the Small-Mammal House, the entire roof of the building is of glass, with top ventilation. Its temperature is maintained at 65°. The interior cages connect with a series of eight outside yards of various shapes and sizes. The largest yard contains 5,600 square feet, the smallest 1,600. Five of the yards have a length of eighty feet, but



THE SMALL-MAMMAL AND OSTRICH HOUSES AND THEIR SURROUNDINGS.

others are nearly square. The ground has been well drained, and covered with two inches of sand.

The fences surrounding the yards are eight feet in height. The posts are of steel T-bars set in concrete, and the wire-work is both hand-made and home-made. It was impossible to find any machine-made fences of a kind suitable for our purpose. The fences are (or will be when fully completed) of meshes that measure three inches square. In the faint hope of discouraging evil-minded visitors from killing the silly ostriches by giving them hardware to swallow, the guard-wires will be set five feet in front of the outside fences. But what can we do with foolish birds that swallow open knives, or with bird-killing visitors who are sly enough to escape detection?

The entire collection of birds to fill the Ostrich House is the gift of Mr. Charles T. Barney, Chairman of the Executive Committee. There are now on exhibition the following:

- | | | |
|---|---------------------------------|-----------------------------|
| 2 | South African Ostriches, adult, | <i>Struthio australis</i> . |
| 2 | North " " " " | " " <i>camelus</i> . |
| 2 | Common Rheas, young, | <i>Rhea americana</i> . |
| 1 | Great-Billed Rhea, | " " <i>macrorhyncha</i> . |

- | | | | |
|---|--------------------------|--------|------------------------------------|
| 3 | Emeus, | adult, | <i>Dromacus novae-hollandiae</i> . |
| 1 | Ceram Cassowary, | " | <i>Casuarus casuarinus</i> . |
| 1 | Violet-Necked Cassowary, | " | " <i>violacollis</i> . |

Other species of the Order *Ratitæ* are being sought for, with which to make the collection truly representative, all of which when procured will be purchased by Mr. Barney to make his gift complete.

The rheas are young, and only half grown; and the ostriches are yet in travel-scarred plumage. Several months must elapse ere all these birds are fully grown, and clothed with the immaculate plumage that we presently will see.

The construction of the walks all around the two new buildings has been a task of no small magnitude, and even with the utmost efforts that could be put forth by a full force of men, winter burst upon us one week too soon. On account of the long-continued freezing weather of December, it has not yet been possible to puddle and roll the surface as conditions require. This will be accomplished, however, long before any considerable crowds of spring visitors surround the new collections.



VIEW OF THE SMALL-MAMMAL HOUSE.

THE SMALL-MAMMAL HOUSE

IN every zoological park or garden there accumulates a great number of medium and small-sized mammals which do not quite fit in

any of the large houses. There are so many small carnivores, it would be quite possible to fill an entire building with the small members of three

families, the *Felidae* (Cats), *Mustelidae* (Marten, Mink, Wolverine, and Weasel), and *Viverridae* (the Civets, Palm Cats, etc.). But there are various large tropical rodents to be considered; and tropical swine, the marsupials generally, and tropical *Canidae*.

It is not possible to provide a separate building for each of the groups named without making a vivarium a bewildering and tiresome place. Even a zoological park can be overdone. We believe there is wisdom in attaining a happy medium, and in not offering the visitor entirely too much.

In pursuance of this idea, the Zoological Society has provided the Small-Mammal House. It represents an effort to assemble in one building the small cats, the small fur-bearers generally of the Family *Mustelidae*; the tropical foxes, jackals, and wild dogs; such large tropical rodents as the long-quilled porcupines, and the capybara; such of the tropical swine as are desirable for exhibition; a limited number of kangaroos and other marsupials, and last but not least in interest and importance, the anteaters and other edentates.

We do not believe in having one building wholly devoted to the small carnivora; for in spite of all efforts, such buildings cannot be kept as wholly free from animal odors as are our other animal buildings. Members of the Society are warned not to expect it! Many animals of the Marten Family, such as the mink and muskrat, naturally emit a musky odor, and the only way to prevent them from doing so is to kill the animals and stuff them. We believe, however, that by the exercise of judgment in the selection of species for exhibition, and a fair understanding with the public regarding the smaller carnivores, backed up by the best mechanical devices for the promotion of cleanliness in the cages, we will be able to maintain the small-mammal collection on a basis acceptable to the public.

The Small-Mammal House occupies the site of the temporary building once used for a similar purpose. Its length over all is 150 feet, its inside width 29 feet, and its outside width, including its outside cages, is 54 feet. The entire roof is of glass, and the interior is as light as an open field. The building extends from north to south, and for at least four hours daily each cage will receive a flood of sunshine.

Altogether there are 176 cages, and they occupy the whole of the side walls of the building, inside and out. Those within are of three sizes, and are placed as follows:

All along the eastern wall there are eighteen cages, seven feet wide, five feet high. In the centre of the western wall there are seventeen cages, four feet wide by three and one-half feet high. At the ends of the western wall there are thirty-two cages, three and one-third feet wide, two and one-half feet high.

The total number of interior cages is eighty-eight.

With but one exception, all the cages of the interior are duplicated on the exterior of the building, and the two series communicate through the walls. In other words, each animal has an outside and an inside cage, with a passage connecting the two, and two sliding doors between with which to regulate conditions. If the sun is too hot, or the air too cold, the interior affords shade or warmth, as may be necessary. If in midsummer the interior of the building becomes too hot for the comfort of a fur-bearing animal, a cage in the open air is made available by the pulling of a chain.

The exception to the rule of duplication between the ins and the outs is found in the outside tier of cages facing the east. These have been expanded into yards seven feet wide by twelve feet long, floored with concrete. Each is provided at the rear with an open-front shelter six feet deep, roofed over against sun and rain, and floored with wood raised a foot higher than the concrete. If these yards fail to meet the views of the animals for which they are intended—kangaroos, tropical swine, and porcupines, capybaras, anteaters, and such—then are they indeed difficult to please.

It is so gratifying to find in another zoological establishment a feature good enough to copy, thus saving ourselves a little of the eternal grind of invention and experiment, we can afford to make prominent mention of all such cases. Few indeed are the persons who know the extent to which the Zoological Park has been invented, and hammered out of the raw material. It gives us pleasure to point out that the chief mechanical principles employed in the construction of the cages along the western wall of the Small-Mammal House were found in operation, in 1902, in the Zoological Garden at Frankfort, Germany. The really admirable movable front, the movable floor, and the sliding partitions of sheet metal, here employed, were designed and worked out by Dr. A. Seitz, the director of the Frankfort Garden.

By means of Dr. Seitz's invention, it is possible to remove in a few seconds the front, either side



INTERIOR VIEW OF THE SMALL-MAMMAL HOUSE.

wall of a cage, and even the floor from a cage of the upper series. In one minute, two, three or four cages can be converted into one. There are two tiers of these cages, one above another, and if an animal requires a particularly high cage, or one of extra length, it is easily arranged. In cleansing the upper cages, all floors and partitions are removed, and by this means they are disinfected with far greater thoroughness and despatch than could otherwise be accomplished.

The floors of the lower series are necessarily fixed, and being so they are covered with lignolith,

and rendered jointless and impervious to moisture, similar to the cage floors in the Primates' House.

For special reasons, the gathering of animals for the Small-Mammal House has not been hastened. In order that the specimens exhibited here should cover as wide a zoological range as may be practicable, the species to be shown require to be selected with much care. Already, however, we have on hand a sufficient number to fill half the building, and the remainder of the total exhibit will rapidly accumulate. The component parts of this collection will be set forth later on.

WILD-ANIMAL PHOTOGRAPHY

THERE is no royal road to success in photographing wild animals. Every really good negative stands for an untold amount of labor and co-operation, and many failures. In animal photography, as in hunting with a gun,

"All hits are history,
All misses, mystery."

Until they try, the inexperienced believe that the only requisites in animal photography are a

kodak, and the freedom of a zoological garden or park. They believe that if only permitted, they can obtain good pictures from the walks, either through the fences or between the bars. Those who have tried it exhaustively know that good pictures cannot be obtained by such off-hand methods.

To secure a good picture of a wild animal, the creature must be made to pose! This means that the corral or cage must be entered, by the artist with



INDIAN LEOPARD.

Photographed in a cage especially arranged for the purpose.

his camera, and a keeper with a club. The animal must be compelled to halt in the right spot, face in the right direction, and stand fast without nervousness while the camera-man approaches dangerously near, and secures on his ground-glass an image that is something more than a suggestion of a deer, antelope, bear, wolf, or whatever the particular Risk may be. An animal portrait is of zoological value in direct proportion to the number of details that it portrays. The ideal picture should show a full side view, with head erect and properly posed; and such accessories as legs, feet, tail, ears, antlers or horns, require adequate representation. A muff-like ball of fur is not necessarily an animal, even though the camera has been brought to bear upon the vital spark.

The actual dangers of wild-animal photography are not to be ignored; and Mr. Sanborn has been assured that in the eyes of the Zoological Society, a man is worth more than any camera. The bears, wolves, and hoofed animals are amenable

to discipline by keeper and club, but in picture-making, the lions and tigers whose cages are entered literally refuse "to stand for it." To meet their case, the Society has been at some pains and expense to invent and provide for Mr. Sanborn's use certain landscape backgrounds, and an aperture in front of them, by means of which good pictures of dangerous carnivores can be secured without risking life, limb, or lens. An example of the results thus obtained is shown herewith.

The Society's collection of wild-animal pictures grows continuously. Of the 1500 negatives now on hand, many represent species of great scientific interest and rarity, and many of them are ideally perfect. Of the apes and the more quiet monkeys, good pictures have been secured, but the baboons remain to be conquered.

A little later, the finest of the animal photographs now being accumulated will be prepared for publication in some form acceptable, and also valuable, to the members of the Society.

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Elwin R. Sanborn, Asst. Editor.

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served as a fulcrum on which to raise a blood-curdling 800-word pipe-dream of "Curator Ditmars' Fight With a Tarantula."

As a fearful example, take a recent case.

One afternoon, a small puma, which is about as dangerous as a cross fox terrier—no more, no less—sprang to catch its piece of meat as the keeper threw the food into the cage. The animal muffed it, knocked the meat back through the open door, and sprang after it, to recover it. Having seized its ration, it withdrew to the nearest corner, outside the cage, to eat it. The keepers procured their nets, and in endeavoring to recapture the animal without being scratched, finally drove it under certain temporary cages that stood near. While visitors passed along the walk, close by, and in sight of the men at work, a shifting box was brought (by Mr. Merkel), the animal was driven into it, and quickly replaced in its cage.

This whole event consumed about fifteen minutes; and the passing visitors did not even know that anything in particular was taking place. Now note the result outside.

In some of the newspapers, the animal appeared as a mountain lion; which is all very well, that being one of its names. In two or three journals, it was "A Lion" that escaped, and spread terror. And this is the story as it was received by London, published in the *Daily Telegraph* and innocently copied therefrom October 6th in the Paris edition of the *Herald*:

LION HUNT IN NEW YORK

NEW YORK, Tuesday.—A great lion hunt occurred to-day at the New York Zoological Gardens. When the keeper entered the cage the lion bounded clean over his head and made a dash for the forest. Fifty men armed with guns and agricultural implements went in pursuit, and finally the lion took refuge behind the monkey-house in a dark corner. A portable cage was now procured, and a big piece of beef was placed inside.

This temptation failed, so a fire hose was procured. The lion did not like the water and sulkily entered the trap prepared for him, after which the door was closed amid cheers.

From the inception of the Zoological Park down to date, only three really exciting incidents have occurred within its bounds. The first was the escape of a black-tailed python from a temporary cage, before the Reptile House was completed. The second was the episode of the newly arrived black bear, that broke out of its travelling box, and bit two persons in being captured. The third was

A WARNING TO OUR MEMBERS

It is well for members of the New York Zoological Society to know that about ninety per cent. of the published stories of fearful adventure by and with the animals of the Zoological Park are fictitious.

As a hot-bed for the generation of blood-curdling stories, our Reptile House is a wonder. One week "Curator Ditmars" permits a (wholly imaginary) collection of twenty-eight newly arrived rattlesnakes to escape from their box, and spread terror that thrills the presses of this city to their inmost vitals. The next week, "Keeper Snyder" has a fierce "Battle With a Monster Python"—all in the mind of a reporter who had been ordered to "get a story." In the dog-days of 1903, when dullness reigned, a pickled tarantula in a bottle

the lamentable killing of the snow leopard. That animal was murdered at midnight by a conjunction of rattled men, when it might easily have been caught if anyone present had done one thing with good judgment.

There are some newspapers whose accounts of happenings with animals, even accidents, are truthful, dignified, and believable. Then again, there are some newspaper men who the moment they strike the trail of a "fight" or an accident go all to pieces, and lose their heads, completely.

Therefore is it well to make haste very slowly in believing stories of fights with animals, escapes, armed men, and screaming women. W. T. H.

EXTINCTION OF WOODLAND BUFFALO

Director Bell of the Canadian Geological Survey in a conversation October 26th reports that the herd of Woodland Buffalo back of the Salt River which falls into the Great Slave River four or five miles below Fort Smith, embraced four or five hundred individuals, according to the report of Tyrrell, some years ago.

A year ago the Indians reported to Director Bell that the herd was reduced to about sixty, but that the Indians in general had scrupulously respected the law. The one exception was the killing of a pair of fine bulls by an Indian who stated that he was forced to kill for meat. He was, however, arrested and punished.

Director Bell believes that the herd is gradually diminishing; that the bulls are not sufficiently numerous or strong to protect the calves from the large packs of wolves which attack the herd in spring.

A SOUTHERN ZOOLOGICAL GARDEN

Very few persons, we venture to say, are aware of the fact that there now exists at Buenos Ayres a well-planned and fully developed zoological garden, which will compare favorably with many of those in Europe and America. The capital city of Argentina has established a zoological institution of which any city in the world might well be proud.

The guide-book of this Jardín Zoológico Municipal exhibits a plan and series of illustrations of

grounds and buildings, dens, cages, and aviaries of a most interesting and permanent character. But for the letterpress, one might easily believe that the establishment had been located and developed in one of the oldest cities of Europe. The guide-book itself is far in advance of those of several institutions much more pretentious. It is well planned, well written and well illustrated, and Director Clemente Onelli may be congratulated on his share of the work.

The references to the plan of the garden show a total of fifty-three features, and the illustrations reveal an attractive ensemble. The illustrations published in the guide-book suggest the Antwerp Garden, with the reservation that the buildings are, as a whole, less expensive.

Of the more substantial structures, the style of architecture has been varied in a manner that is both pleasing and interesting. Oriental animals have been provided with oriental buildings. The ostriches are quartered in a very fair imitation of an African hut. The "habitation" of the elephants is called a "temple," and the grand aviary suggests the Taj Mehal. The most startling feature of all is the great wire cage for the condors, which, through its spreading base and lofty central turret, immediately suggests the Eiffel Tower.

A glance at the list of animals in the collection reveals a very creditable array of mammals and birds, but a scarcity of reptiles. The various orders and important families of mammals are well represented, and, as might be inferred from the demands of zoological gardens generally, the majority of the species have come from the Old World. In birds South America is more adequately represented. Of reptiles only eight species are named in the list, and these are represented by a total of only thirteen specimens. It should be remembered, however, that the zoological garden of Buenos Ayres is not the only one which pays little attention to reptiles.

The members of our Society will be interested in the fact that this is a municipal Zoological Garden, established partly by the city, and aided by individual effort. As may readily be inferred, the Garden owes its existence to the combined interest of the scientific men of Buenos Ayres, joined with that of the highest officials of the city and nation.

W. T. H.



MOSQUITO LARVÆ.

A MOSQUITO OBJECT-LESSON AT THE AQUARIUM

By CHARLES H. TOWNSEND

IF anything more were needed for the indictment of the mosquito as a criminal deserving of the death penalty, the trial conducted by the American Mosquito Extermination Society in New York City on December 15th and 16th would appear to have furnished the evidence.

The meeting was attended by medical men, entomologists, and other citizens who have been prominently before the public in the world-wide crusade against the mosquito as the only known disseminator of malaria, yellow-fever, filariasis, and a universal enemy to the comfort of humanity. The connection of the mosquito with disease, its rapid propagation in standing water everywhere, its extermination by the draining of swamps and the protection of water-tanks, and its elimination from ornamental lakes and ponds by the introduction of larvæ-eating fishes were discussed at length. Papers were read on the species of mosquitoes, the work accomplished by boards of health, and the progress made during the year in combating the mosquito nuisance.

The interesting exhibit of mosquito larvæ hatching in stagnant water, which has been maintained at the New York Aquarium during the past summer, attracted the attention of members of the Mosquito Extermination Society several weeks ago, and its value as an object lesson was commented upon in their November Bulletin.

In order that this exhibit might be seen by members attending the annual convention, it was arranged that the first session be held in the lecture-room of the Aquarium.

The Director of the Aquarium had prepared especially for the meeting a series of exhibits showing the mosquito in its larval, pupæ, and fully matured stages. A series of aquarium tanks containing specimens of fresh- and brackish-water fishes useful as destroyers of mosquito larvæ were also provided. Three species of mosquitoes were exhibited, one of which (*Aedes fuscus*) had not been observed alive by many members. This is a very small species which breeds largely in the pitchers of the pitcher plant (*Sarracenia*), and which winters in the larval stage. The specimens of this species were furnished by Mr. J. Turner Brakeley, of Hornerstown, N. J. Dr. Kohnke, President of the New Orleans Board of Health, furnished a large collection of mosquito larvæ from Louisiana.

The mosquito-hatching exhibit at the Aquarium was observed during the summer by many thousand persons. It is instructively labelled, and has attracted much attention. Its value as an object lesson suitable for schools and museums cannot be overestimated. There has scarcely been a moment during the open hours at the Aquarium when visitors were not reading the labels of the mosquito jars, and making comments on the wrigglers and mosquitoes which they contained. Observations by the attendants showed that the great majority of persons who examined the exhibit made such remarks as "Well, that's a new one on me!" or, "I didn't know mosquitoes grew that way." The label of one of the jars reads as follows:

"Mosquitoes lay their eggs in clusters on the surface of still water, such as is found in rain-barrels, cisterns, ditches, stagnant ponds, undrained swamps, and marshes.

"Each female mosquito lays from 150 to 400 eggs, which, in about a week, hatch into larvæ or 'wrigglers.' About a week later the 'wrigglers' become mosquitoes. The mosquito is the only known source of malaria and yellow-fever. If the breeding places of mosquitoes can be obliterated, malaria and yellow-fever can be wiped out, and annoyance from mosquito-bites avoided."

Before leaving the exhibit, visitors were pretty sure to express the hope that the mosquitoes in the jars were not being turned loose.

While scientific men are thoroughly informed as to the danger which threatens mankind through the existence of the mosquito, the work of educating the public at large has not made the progress, in some parts of the country, which it should have made.

Mosquitoes are found in all parts of the world. Although all kinds of mosquitoes are not liable to be the bearers of disease germs, there are dangerous species in most countries. Mosquitoes of the genus *Anopheles*, which are solely responsible for malaria,

one of the most wide-spread diseases afflicting humanity, are abundant in our midst. Along our Gulf Coast dwells the *Stegomyia* mosquito, the only known disseminator of the germs of yellow-fever.

Malaria is now believed to be responsible for more sickness among the white population of the South than any other disease, and the idea that it can be spread by any other means than by mosquitoes is considered by science to be merely a superstition. The idea that mosquitoes can be propagated without water is totally without foundation. Mosquitoes become troublesome wherever there is stagnant water in which they can breed unmolested, and stagnant pools of all kinds are therefore dangerous.

Waters inhabited by fishes and other animals which prey upon mosquito larvae cannot produce them. Troublesome ponds may be cleared of mosquito larvae by the introduction of fishes.

The evil resulting from undrained swamps and marshes is very great. Such areas can be relieved of the standing water, in which mosquitoes breed, by ditching, and small pools and water tanks which cannot be conveniently drained or disposed of can be made mosquito-proof by covering the surface of the water with oil. There is now no doubt whatever that many localities can find relief from the mosquito plague by simple and cheap methods, while in others the conditions are such that the work involves great expense.

There are now large numbers of medical and scientific students of the mosquito problem in this and other countries, who believe that it can be practically exterminated in many regions. The warfare against it has resulted successfully in instances too numerous to mention. It is being carried on by boards of health, real-estate companies, town corporations, private citizens, and even railroads. Mosquito-eating fishes are being introduced into public and private ponds that have caused trouble. Cisterns and tanks are being provided with wire screens to prevent the ingress of egg-laying mosquitoes, and in many other ways enlightened communities are finding relief from the annoyances and diseases due to mosquitoes.

The writer has had very trying experiences with mosquitoes in the Arctic portions of Alaska. During the short Arctic summer the cold, moss-grown morasses of that region breed mosquitoes in vast numbers, and life is almost unbearable if one is not protected against them by gloves and veils. Sleep is scarcely possible without the protection of netting.

In Arctic lands mosquitoes probably pass the winter in the larval or "wiggler" stage. It would scarcely be possible for the adult insects to go through the winter alive, as they do in warmer regions. There is no malaria in the far north, either because the mosquitoes there have never been infected, or else the disease-bearing kinds do not

occur there. The history of malaria shows that many mosquito-afflicted localities never had the disease until persons suffering from it came there and inoculated the mosquitoes. This has been demonstrated in localities to which gangs of railway laborers were sent from malarial neighborhoods.

The instruction of the public at large on the natural history of the mosquito, and its connection with malaria and yellow-fever, is so desirable that no means of accomplishing that end should be neglected. The mosquito-hatching exhibit at the Aquarium, where the attendance averages five thousand persons daily the year round, cannot fail to teach an interesting and useful lesson. It is seen by visitors from all parts of the country. If such a simple and inexpensive object lesson could be given for a single week in each school in the country, the rising generation would be well equipped to deal with the mosquito trouble.

A glass half full of water, containing wrigglers from the nearest cistern, rain-barrel, or puddle, would constitute an object lesson sufficiently striking to fix in the mind permanently the main fact respecting the mosquito. Much of our effort to-day should therefore be directed toward locating the propaganda in the public schools.

The most effective enemies of the mosquito are fishes. The Director of the Aquarium has had many applications for information respecting the kinds of fishes most available for introduction into small ponds as destroyers of mosquito larvae. There are many kinds of fishes useful for this purpose, but the top-minnows (*Fundulus* and *Gambusia*) are probably the best. It has been observed that the common goldfish will keep ponds clear of wrigglers, while sticklebacks and killifish are always useful.

The young of sunfishes, shiners, perches, and other common pond fishes doubtless are feeders upon larvae. Such fishes are found in the lakes of Central and Prospect Parks, and would probably be entirely effective for the purpose, if the shallow portions of some lakes did not become clogged with pond-weed so as to impede their movements. Top-minnows are useful in such cases, as they can readily penetrate the weedy places.

It has been shown by entomologists that it is not the larger park lakes well supplied with fishes which give trouble, but the smaller pools to which fishes do not have access. With proper attention to the lakes and pools, our parks could be kept entirely free from mosquitoes.

Good series of fresh- and brackish-water minnows, sticklebacks, and other species known to feed on mosquito larvae will be kept on exhibition at the Aquarium hereafter, and will be so labelled as to be satisfactory object lessons on the subject. The principal lesson to be taught in this connection is that the ill we suffer on account of the mosquito are to an important degree unnecessary.



SPECTACLE OWL.

THE SPECTACLE OWL

WHEN an unknown but interesting bird arrives at the Zoological Park, after housing it comfortably the first thing is to find out its name, and that done to discover what has been written of its food and of its habits. One day the express brought a strange-looking Owl, labelled South America. His eyes were large, round, and yellow; his toes were two in front and two behind, as any owl's should be; but his breast, back, and head were covered with the most delicate, fluffly down of purest white, while across his face, mask-wise, was a band of black from which his yellow eyes glared and his beak snapped ominously.

His apt name was soon found,—the Spectacle Owl of Central America, but search for an account of his habits was continued in vain. The downy fellow was in his juvenile dress, and within a month single black and brown feathers began to appear here and there, until at present his back and wings are full-feathered, the latter brown, crossed with a band of white spots. His breast and under parts are changing little by little from white to a warm buffy color, while his head and his black mask still remain the same. When he becomes adult the beautiful white head feathers will be lost, and replaced with others of a dark chocolate color.

The Latin name of this bird is *Pulsatrix perspicillata*,

which tells us only what we know is true of all owls, that they are fierce hunters and keen of sight.

What peculiar characteristics are his yet remain to be seen. He has thus far uttered no sound. He seems active, even in strong sunlight, takes a thorough bath daily and enjoys a diet of mice and sparrows. Scores of times each day he hears his black mask compared to the goggles of an automobilist by the admiring crowds which pass his cage.

C. WILLIAM BEEBE.

A NEW COLLECTION AT THE AQUARIUM

Through the courtesy of the United States Fisheries Bureau, the fishes which were on exhibition at the Exposition at St. Louis have been transferred to the New York Aquarium.

The Fisheries Bureau has maintained an excellent aquarium at the Exposition during the summer, which was perhaps the most popular exhibit on the grounds.

The collection transferred successfully to New York numbered 180 specimens, in which were represented thirty-seven species, including one seal and two turtles. Although the majority of the fishes were tropical or southern species the transfer was made during cold winter weather with the loss of only

thirty specimens, the success attained being due chiefly to the zeal and ability of Mr. Burnham, of the car service of the Fisheries Bureau. The government fish transportation cars, six in number, are built especially for fish-cultural work, and have permanent crews living on board. During transportation, fishes require attention day and night.

Among the fishes received from St. Louis were grayling, large lake trout, quillbacks, and short-nosed gars, from western waters. There were red-snappers, sheepshead, channel bass, file-fish, pilot-fish, and spade-fish from southern waters, and many beautiful species from the Bermudas. The Aquarium has not had specimens of grayling, red-snapper, spade-fish, and sheepshead for several years.

The Zoological Society is to be congratulated on having such profitable and pleasant relations with United States Fish Commissioner Bowers and his representative at St. Louis, Mr. Ravenel.

C. H. T.

Recent important additions to the collection of rare birds are—a Little Brown Crane and two Willow Ptarmigan from Alaska, north of the Arctic Circle; a Tiger Bittern from Mexico, and a Patagonian Lapwing Plover from the Argentine Republic.



ERECTING THE TOTEM-POLE AND HOUSE.

September 23, 1904.

A TLINKIT TOTEM-POLE

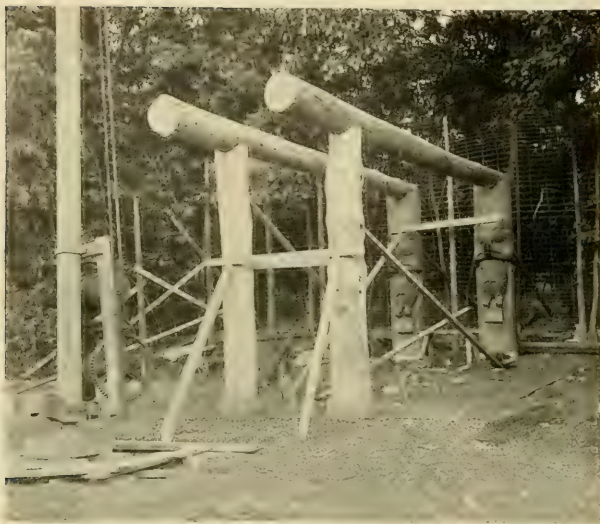
OF all the industrial products of our Alaskan Indians, there is none which equals the totem-pole. Ethnologically it is everything that could be desired, and its spectacular value is very great. We know of no other savage carvings quite equal in scope to the giant tree-trunks of the Alaskan coast that have been fashioned into columnar masses of bears, beavers, cetaceans, men, birds, and other things too numerous to mention.

It is not strange that enterprising collectors of ethnological materials cast covetous eyes upon the totem-poles of the Haidah, Tlinkit, and other Indians of Alaska. Some enterprising citizens of Seattle once sequestered a very fine totem-pole, and later erected it in a public square in the town of continuous hills. And subsequently, the Indian owners of the pole sued the city of Seattle for its

value, and actually recovered \$2,500, thereby fixing the value of such carvings.

When the Harriman Alaska Expedition touched at Cape Fox, in July, 1899, they found there an abandoned Tlinkit Indian village, before which stood several interesting and well-preserved totem-poles. Inasmuch as all the former inhabitants had departed never to return, and the whole village was going to decay, Mr. E. H. Harriman decided to bring away the chief's house and the lofty totem-pole which stood in front of it. With great labor the huge pole was hoisted aboard the steamer George W. Elder, and stowed away. The house was successfully taken to pieces, and handled with less difficulty.

On the arrival of the Expedition at Seattle, both these gigantic "specimens" were presented to the



FRAMEWORK OF THE TLINKIT HOUSE.

Zoological Society, and later on were delivered at the Zoological Park at the expense of Mr. Harriman. For several months the question of the best site for this unique gift was considered, and reconsidered. At last, however, the ideal spot was chosen, fronting upon the Aquatic Mammals' Pond, and close up against the trees of the wooded ridge on which the Wild Turkeys' Enclosure is located. It is absolutely necessary that an Alaskan Indian house and totem-pole should front on water, and be backed by forest.

Beyond question, this unique exhibit is one of the most picturesque and striking in the whole of the Zoological Park. The pole is forty-seven feet high above the ground, and three feet two inches in diameter at its base, where

the carven bears begin. With a true sense of proportion, it tapers toward the top, where it is surmounted by a colossal figure of a thunder-bird, possibly a gull, carved in wood. In cross section the pole is broadly elliptical, with one side to the front. The front and the edges were painted, but the back never has been colored. Through wear and tear the original colors—red, green, white, and black—had lost so much of their freshness that it was decided to restore them. This was done with great care, and to-day the specimen looks precisely as it did when it first went up on Cape Fox.

The house front is thirty-nine feet wide, by seventeen feet high to the peak of the roof; and the entire front is occupied



THE TOTEM-POLE AND HOUSE, AS FINISHED.

Gift of Mr. E. H. Harriman

by two gigantic figures of bears, heavily studded with teeth and claws. The colors of these figures, also, have been restored, and as a corollary to the totem-pole they are very impressive. The building has not been arranged to admit visitors.

The descriptive label which has been provided for this exhibit of savage art and industry explains that a totem-pole is really the clan monument or family crest of its owner. Each carved or painted

animal is produced for a specific purpose, to represent either a clan, a family, or an individual, as the case may be. Even in the days of Hiawatha,

" . . . they painted on the grave-posts
Each his own ancestral totem.
Each the symbol of his household
Figures of the Bear and Reindeer,
Of the Turtle, Crane, and Beaver.
Each inverted, as a token
That the owner was departed."



THE RIDING-ANIMAL ESTABLISHMENT.

THE RIDING-ANIMAL ESTABLISHMENT

SO far as developed the riding-animal establishment has proven a gratifying success. The profits for the summer nearly paid for the equipment. Ten thousand tickets for the ponies and carts were sold, and twenty-five hundred for the elephant. The total net sum realized was \$1,375. As soon as the elephant commenced his daily trips, the interest in the riding increased materially,

and continued unabated until the season closed. The children are highly pleased with it, and the animals have behaved with dignity and decorum. As a riding elephant, Gunda has proven to be very reliable, and also interested in his work. But we are yet without a camel. Of the many camels offered and inspected, not one was large enough or handsome enough to be acceptable.



YOUNG ROCKY MOUNTAIN GOATS.

AT LAST THE MOUNTAIN GOAT

LIKE the mountain sheep, wolverine, and Canada lynx, the mountain goat is to every zoological park or garden a very elusive animal. Although quite a number have been caught, both young and adult, in at least nine cases out of every ten they have come to grief in a short time. Of a lot of seven kids that were caught last spring especially for us, all died of lung and intestinal troubles, long before they were to have been shipped. One adult animal broke a leg and had to be killed, and another died of malnutrition.

The isolated zoological position of the Mountain Goat, and the fact that it is our boldest and best cliff-climber, makes it an animal of special interest to the public. After two years of correspondence, and one active campaign a-field, the Zoological Society has succeeded in securing a pair of specimens of a highly satisfactory character. They were captured on June 10th and 11th, on White River, a tributary of the Kootenay, about one

hundred miles south of Fort Steele, British Columbia. They are of opposite sexes and came from two well-separated bands. They were kept at Fort Steele until last October, and were brought on in cool weather, arriving in fine condition. Because of the fact that they are yet young and small, they have been quartered in the Prong-Horned Antelopes' House, near the Southwest Entrance. They are very droll little creatures, and are keenly scrutinized by visitors.

At present they are feeding well, on clover hay and crushed oats, and are in perfect health. Excepting the pair exhibited for about two years in the Philadelphia Zoological Garden (now dead), and two shown a few years ago in the Boston Sportsmen's Show, these appear to be the only living specimens of their kind ever exhibited in the United States. In the spring they will be transferred to their permanent home on Mountain Sheep Hill.

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April, 1905

FURTHER IMPROVEMENTS AT THE AQUARIUM.

THROUGH the generosity of the City of New York, the Zoological Society has been able to make steady progress in its work of rehabilitating the equipment of the Aquarium and the improvement of the building generally. Owing to the fact that the Aquarium is visited daily by great numbers of people, the work has progressed slowly. While

construction and repair work of different kinds has necessarily kept some portions of the building in unsightly condition, the comfort of visitors has been but little disturbed. The exhibits in general have been even larger than heretofore.

Certain works of improvement, commenced last summer, were brought to a standstill for some



QUILL BACK AND CRAPPIE.

From a flash-light photograph.



CONSTRUCTING PIPE GALLERIES.

time, owing to the fact that most of the salt-water tanks require heating during the winter months. Early in the summer it will be possible to disconnect the heating appliances and change to the new salt-water system. The storage reservoir itself

was completed some time ago. During the winter the large filters, to be used in connection with stored sea-water, were installed and the rusty iron pipes in the salt-water circulation were replaced by lead-lined pipes, so that the Aquarium will soon have its much-to-be-desired supply of pure, clear and safe ocean-water. This means greater safety for the present collections and the addition of many species which could never be kept by the old method, especially among the invertebrates.

An important piece of work carried on during the winter was the construction of pipe galleries under the building. The contractor, Mr. Chas. Wille, is now renewing a large amount of worn-out piping, which has been buried in the earth ever since the Aquarium was established, and which, from its situation, could never be repaired. The newly completed pipe galleries will contain piping for both heating and water systems, and will render them accessible at all times.

Contracts will soon be made for the purpose of improving the heating and ventilation, when the building, as a whole, should be in fine condition for years to come.

Among the improvements made from the regular maintenance fund, may be mentioned the installation of electric lights over the exhibition tanks. Artificial light has always been greatly needed here on dark days.



PHOTOGRAPH OF A LIVE FISH.

Made in 1888 by C. H. Townsend.

PHOTOGRAPHY AT THE AQUARIUM.

MANY of the visitors to the Aquarium request permission to use their cameras, not realizing that the exposure of photographic plates in such a building must be of long duration. In order to secure the best results in exhibiting specimens in any aquarium the interior of the building is somewhat darkened, light being admitted as much as

possible through the exhibition tanks. The apparent brilliancy of the tanks, even on the brightest days, is misleading, and the making of instantaneous photographs is quite impossible. Time exposures on moving objects are, of course, worthless.

The photographs of fishes living in the Aquarium, which have appeared from time to time in



SPOTTED MORAY.

From a flash-light photograph by W. I. Beasley.

the publications of the Society, were all instantaneous pictures made out of doors. The method of procedure has been to place each species in a small narrow tank, so narrow that the fish would be retained close to the glass and prevented from getting out of focus. The tank was then carried out onto the roof and quick work was necessary, as specimens soon became distressed and were endangered if the circulation of water was long cut off. After the fish has quieted down it is usually possible to make a sharp focus and get a good picture. Retaining several specimens in these extremely narrow tanks is risky, and the picture ordinarily secured has been merely a portrait of a single individual. The photographing of groups of fishes in the tanks at the New York Aquarium has been practicable only by flash-light. A few years ago Mr. N. Lazarnick made flash-light photographs of some fishes in the New York Aquarium, getting fairly good results. In the Aquarium of the Fish Commission at Washington, which is better lighted, Dr. R. W. Shufeldt made successful instantaneous exposures by daylight.

By the method of outdoor work with small aquaria, good fish portraits have been made by Mr. A. R. Dugmore, for Doubleday, Page & Co.,

and by Dr. Shufeldt and a few other photographers. Some naturalistic effects are secured by placing rocks, fresh-water plants and bits of sea-weed in the tanks. In most cases the fishes are shown resting on the bottom, with most of the fins depressed. The flash-light work done by Mr. E. R. Sanborn without any disturbing or frightening of the fishes, and with the groups displayed in many interesting positions, represents a distinct advance in fish photography. There is more natural history in the picture, and the suggestion of fake would never present itself. *The accompanying picture of the striped moray (*Channomurana*) by Mr. Letkemann, in one of the large tanks, is a daylight picture which required, of course, a time exposure, with the animal lying very still. The picture of the spotted moray (*Lycodontis*), by Mr. Beasley, was made by flash-light.

The portraits of sunfish and sea-bass, by Mr. Spencer, are very satisfactory types of the fish portraits made out of doors in a small tank, with instantaneous exposures. Observe the detail in the

* It is a fact that many photographs of dead fishes, with open mouths and shriveled fins, have been given naturalistic backgrounds by unscrupulous publishers, and are now doing duty as live-fish photographs.



CARP.

From a flash-light photograph.



PEARL ROACH.

Daylight photograph by H. V. Letkemann.



CRAPPIE.

pictures of the horned-mullet and sea-bass. Mr. Spencer has also made some excellent photographs of living corals. Mr. Sanborn's pictures of the young striped bass, crappie, and pickerel, made in the same way, are equally satisfactory. The pictures of the outdoor photographic tank containing sea-horse and sunfish were made by Mr. Beasley. As an example of instantaneous outdoor work, with the small tank, the picture by Mr. Letkemann, showing six specimens of the pearl roach, is unsurpassed both in depth, distinctness, and artistic arrangement.

Mr. Sanborn recently undertook the making of flash-light pictures directly from the large exhibition tanks, the results of which are presented in this bulletin. The greatest difficulty encountered was getting the groups of fishes into focus, and it seems impossible to do this with all the fishes in sight; usually, however, a sufficient number are sharply outlined. The best results were finally secured by exploding flashes on each side of the camera simultaneously. It was found, also, that better results could be secured by working at

night, rather than by day, electric lights being first turned on immediately above the water to permit of good focus on the fishes. In photographing the big tanks there were usually reflections, in the glass, of the camera or the operator; this was finally obviated by the hanging of a dark curtain, through which merely the lens was allowed to show.

A photograph, made by the writer in 1888, is presented herewith as a matter of interest in the history of live-fish photography. At that time I made numerous photographs

of living fishes on board the U. S. S. Albatross, in the Pacific Ocean. The tank, constructed by myself, had wooden ends and bottom, the front and back being of ordinary window glass. It was about 15 inches long, 10 inches high, and 4 inches wide. All exposures were instantaneous, made on the hurricane deck, with the ship in motion. This work was done nine years before live-fish photography was taken up so successfully by Dr. Shufeldt, and the present example is an average of the lot. Further experiments with flash-light, by improved methods, may be expected to yield even better



PICKEREL.



TANK USED FOR PHOTOGRAPHING
SMALL SPECIMENS.



SEA-HORSES.

Photographs by W. L. Beasley.

results than those already secured by Mr. Sanborn.

Mr. E. F. Keller has made a number of very satisfactory photographs of living fishes, which have been published in previous numbers of the Bulletin.

THE RUDD OR "PEARL ROACH."

Dr. Tarleton H. Bean has reexamined specimens of the so-called pearl roach in the Aquarium, and has found that it does not belong to the American species of the genus *Abramis* as mentioned by him in the Bulletin of the American Museum of Natural History in 1897, and in his catalogue of the Fishes of New York, published in Albany in 1903, under the name *Abramis crysoleucas roseus*.

It has a keel on the abdomen, behind the ventrals, but saddle-shaped scales pass over it. The teeth are hooked, crenate,

five in the principal row and three in the inner row.

The pearl roach is one of the most attractive fresh-water fishes in the Aquarium. It reaches a larger size than the golden shiner, and has brilliant vermilion fins. It is found only in lakes in Central Park, New York City, where it is abundant.

This is evidently a species introduced from Europe; it agrees very well with Günther's description and Couch's figure of the rudd (*Leuciscus erythrophthalmus*).

The pearl roach in the Aquarium was originally called Irish roach because it was said to have come from Ireland. Couch states that the rudd has usurped the name of roach in many parts of Ireland. The identification with the European rudd if verified by comparison with specimens of undoubted



HORNED-MULLET.

Photograph by L. B. Spencer.

European origin will dispose of one of the most interesting puzzles among our fishes.



STRIPED MORAY.
Photograph by H. V. Letkemann.



QUINNAT SALMON.
From a flash-light photograph.

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EDITED BY THE DIRECTOR

Elwin R. Sanborn, Asst. Editor.

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SCIENTIFIC WORK AT THE AQUARIUM.

The subject of water density and its effect on fishes, is one in which the management of the Aquarium is deeply interested. The Director invited Dr. Francis B. Sumner, of the College of the City of New York, to continue at the Aquarium the experiments with killifishes, begun by him at Woods Hole last summer. These very small salt-water fishes are always kept in abundance as food for the larger species on exhibition, and certain tanks in the service gallery have been placed at Dr. Sumner's disposal. At the present time all fishes dying in the Aquarium are being subjected to careful pathological examinations in the hope that it may lead to a better understanding of their condition in captivity.

The experiments conducted by Dr. Field in the laboratory of the Aquarium in 1903, relative to

the infection of oysters with typhoid bacilli, presented in the Eighth Annual Report of the Society, were interesting and valuable.

Dr. Sumner has consented to make the following preliminary remarks respecting the character of his studies:

EXPERIMENTAL STUDIES OF FITNESS IN FISHES.

It is a commonplace among zoologists, that all animals are not equally adapted to particular conditions of life or equally fitted to withstand unfavorable circumstances in their environment. Not only do species differ from one another in their degree of adaptation to given conditions, but, within the limits of a species, the individuals present a wide range of variation in this respect.

If, for example, specimens of the three commoner kinds of *Fundulus* ("killifish") be placed together in a pail of water, in numbers sufficient to quickly exhaust the oxygen, we note that all three do not succumb at the same rate, but that *F. heteroclitus* is much more hardy than is *F. majalis* or *F. diaphanus*. Similarly, if we take any one of these species alone, we find that all individuals do not die at once, but that some die long before others, i. e., they vary in their power to resist asphyxiation.

In the case of two different species, we find, of course, obvious structural differences, in addition to those functional differences which make one more "hardy" than another. They may differ in shape, color, fin and scale characters, etc. Are any such structural differences to be discovered between the more and the less resistant lots within the limits of a species? If present, they can only be revealed by making accurate measurements of particular features in great numbers of individuals.

Studies begun in the laboratory of the Bureau of Fisheries at Woods Hole, Mass., and continued at the New York Aquarium, have in view a determination of the measurable differences between the more and the less "fit" members of particular species of fish in the presence of various conditions. Is the "fitter" type, with respect to asphyxiation, the same as the "fitter" type with respect to the attacks of fungus or to sudden changes in the surrounding medium? Do the more fit and the less fit individuals of *Fundulus heteroclitus* differ in the same traits as do the more and the less fit of

Fundulus majalis or *F. diaphanus*? These and many other questions have an obviously important bearing upon current discussions of variation, natural selection, etc.

Incidentally, numerous other experiments are being made upon several species of fish. To what degree do they withstand sudden changes in the density of the water? To what degree is acclimatization possible? Do the salts contained in the blood remain in the same degree of concentration whatever the density of the surrounding water? To what is death due when a fish is abruptly changed from fresh to salt water or vice versa? Under what conditions does the fungus *Saprolegnia* attack fish? It is at present impossible for me to give satisfactory answers to any of these questions, but it is hoped that the present experiments may aid in their solution.

Francis B. Sumner.

DR. MAYER'S BOOK.

The manuscript and illustrations for a work on the invertebrates of the New York coast, presented to the Zoological Society by Dr. A. G. Mayer, Director of the Marine Biological Laboratory at the Tortugas Islands, Florida, is now in the hands of the printer, and will be issued in the near future.

In accordance with Dr. Mayer's wishes the profits accruing from the sale of the book will be devoted to the improvement of the New York Aquarium. Although this work will be accepted as authoritative from a scientific point of view, having been carefully prepared by a professional zoologist of the highest standing, it is thoroughly popular in character. Dr. Mayer's studies of the invertebrates have been conducted both in the field and in the laboratory. He is not only well acquainted with the invertebrates of our own coast, but has studied marine life in Japan and among the islands of the South Pacific Ocean.

During the winter of 1899-1900 he was a member of the scientific staff of the United States Steamship "Albatross," engaged in deep-sea explorations in the Pacific. He is the joint author with Professor Agassiz of a number of important scientific papers on invertebrates.

The book will be placed on sale by the Zoological Society at the Aquarium and elsewhere, and will constitute the first volume of the *New York Aquarium Nature Series*. It is intended chiefly as

a guide to the sea-shore life of the New York coast and will be of value to teachers and to nature-students generally. It presents the facts of modern zoological investigation so clearly, and is so pleasantly written, that it will be attractive to the general reader.

The illustrations are from original photographs made by the author.

Attendance.—The attendance at the New York Aquarium during the year 1904 was 1,625,770, an increase of 77,879 over 1903. The daily average for the year was 4,454.

GENERAL INFORMATION.

ADMISSION TO THE PARK.—On all holidays and on Sunday, Tuesday, Wednesday, Friday, and Saturday, admission to the Zoological Park is free.

On every Monday and Thursday, save when either of these days falls on a holiday, only members of the Society, and persons holding tickets from the Society, are admitted free. All others pay twenty-five cents for each adult, and fifteen cents for each child under twelve years of age. Tickets are sold only at the entrances.

Admission to the Aquarium is confined to members on Monday forenoons. It is open to the public from May 1 to October 31, 9 A. M. to 5 P. M., and from November 1 to April 30, 10 A. M. to 4 P. M. When a holiday occurs on Monday, the forenoon will be available to the public.

OPENING AND CLOSING.—From May 1st to November 1st the entrance-gates will be opened at 9 A. M. and closed half an hour before sunset. From November 1st to May 1st, the gates will open at 10 A. M.

BICYCLES must be checked at the entrances (five cents). All wheels not called for half an hour before sunset will be locked up until the following day.

RESTAURANT.—At the Rocking Stone Restaurant meals are served à la carte every day from 10 A. M. to the closing hour. The North Pavilion of this building has a spacious lunch counter, where all kinds of luncheon food are served at popular prices.

The South Pavilion is now arranged as an open air dining-room. The service has been increased and improved. Large numbers can be served expeditiously.

PUBLICATIONS

FIRST ANNUAL REPORT	Paper, 40 cents
SECOND " " " " " " " " " " " "	Paper, 75 cents. Cloth, \$1.00
THIRD " " " " " " " " " " " "	" 40 " " 0.60
FOURTH " " " " " " " " " " " "	" 40 " " 0.60
FIFTH " " " " " " " " " " " "	" 75 " " 1.00
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SEVENTH " " " " " " " " " " " "	" \$1.00 " 1.25
EIGHTH " " " " " " " " " " " "	" 1.00 " 1.25
NOTES ON THE MOUNTAIN SHEEP OF NORTH AMERICA. (Hornaday).	Paper, 40 cents
DESTRUCTION OF OUR BIRDS AND MAMMALS. (Hornaday).	" 25 "
THE CARIBOU. (Grant).	Paper, 40 "
THE ORIGIN AND RELATIONSHIP OF THE LARGE MAMMALS OF NORTH AMERICA. (Grant). Cloth.	\$1.00
GUIDE BOOK OF THE ZOOLOGICAL PARK. With maps and illustrations. (Hornaday).	25 cents
VEWS IN THE ZOOLOGICAL PARK. Size 5 x 7. 20 illustrations.	" "
POST CARDS. Various subjects.	Two cards, 5 "
POST CARDS. Colored.	One card, 5 "
BULLETIN No. 1.	50 "
BULLETIN Nos. 2, 3, and 4.	10 "
BULLETIN Nos. 5 to 17.	15 "

The publications are for sale at the Office of the Society, 11 Wall Street, The Zoological Park, and The New York Aquarium.



CHAMBERED NAUTILUS.

From a radiograph by Dr. H. G. Piffard.

"———every chambered cell,
Where its dim dreaming life was wont to dwell,
As the frail tenant shaped his growing shell,
Before thee lies revealed,—
Its irised ceiling rent, its sunless crypt unsealed."

—The Chambered Nautilus. OLIVER WENDELL HOLMES.

SOME SEA-SHELL RADIOGRAPHS.

THE Zoological Society is indebted to Dr. H. G.

Piffard, of New York, for the use of a couple of pictures of sea-shells from the excellent series of radiographs made by himself. The X-ray is in practical use by the medical, and some other professions, but has not been specially utilized by naturalists. Director Bumpus, of the American Museum of Natural History, secured excellent results with the X-ray in showing the vertebrae of batrachians. Radiographs of sea-shells and other objects of natural history are valuable in showing structure as well as exterior outline and general

appearance. It is quite possible that radiographs would indicate differences between closely related species that could not be shown in other ways. As the nautilus grows it periodically secretes septa in the back of the body chamber, which, gradually increasing in size, form a series of air cells. These are connected with a tube, and, when filled with air, serve to maintain the relative weight of the growing animal and its shell with the water. In museums it is a common practice to split sea-shells with a saw, in order to reveal features of structure. The accompanying photograph of the nautilus, by Mr.



SECTIONAL VIEW OF THE NAUTILUS.

Photograph by L. B. Spencer.

Spencer, may be used in comparison with Dr. Piffard's radiograph. The latter shows, admirably, the strengthening effect of the septa, which divide the air-cells, upon the shell itself. The siphuncle, by which air is conveyed to the air chambers, is

shown in more than a dozen septa. The radiograph shows practically all that the actual specimen shows, and something in addition. Taken together they reveal about all there is inside of the object.



FASCIOLARIA.

From a radiograph by Dr. H. G. Piffard.



HYBRID TROUT.

From a flash-light photograph.

THE LOBSTER QUESTION.

THE artificial propagation of the lobster has been studied and experimented upon by the United States Fisheries Bureau ever since 1888. The experiments were attended with greater success from year to year, the number of lobsters hatched annually varying during recent years, from fifty to one hundred million fry.

The artificial hatching of lobsters on a large scale is not difficult, but carrying them through the critical periods of infancy is quite another matter, and hitherto it has been necessary to liberate them at so early an age that the artificial method has produced only very moderate results. In its three earlier stages of development, the lobster is a free-swimming creature, exposed to a host of natural enemies, and on account of its helplessness its protection in the hatchery is necessary until the fourth stage, when it is old enough to sink to the bottom.

The difficulties in the way of success were lack of suitable food, tendency to cannibalism during the frequent moultings of the shell, and infection from diatom growths.

At the end of each season's work more or less progress in lobster culture has been recorded. Different methods of feeding were tried until satisfactory foods were discovered, the most practical being the flesh of the menhaden. Experiments in different regions showed that some localities yielded better results than others; the best being a protected bay where water temperature was higher and its density lower than at the original experiment stations.

Cannibalism among the young fry proved so seri-

ous that it could only be prevented by the *constant agitation of the water*, and experiments in this line by mechanical means rapidly led to better results. The proportion of fry carried through to the fourth or "lobsterling" stage has been greater as a result of the recent experiments than ever before, and the outlook is now very hopeful. The United States Bureau of Fisheries and the Rhode Island Fish Commission are entitled to great credit for the recent progress in lobster culture.

Restrictions on lobster fishing have been ineffective, and the supply of lobsters has long been declining. In 1889 the catch for the year was thirty million pounds, worth over \$833,000. In 1902 the catch was only half that amount, but was valued at over \$1,271,000.

The lobster has proved one of the most difficult species to deal with, from the fish-culturist's point of view. It is not only difficult to handle in infancy, as has been stated, but is of very slow growth. It does not reach the breeding age for four or five years, and does not attain good marketable size until seven or eight years old. Although the results of the last two or three season's investigations are most encouraging, we must not expect any early effect on a fishery so nearly exhausted, and so persistently carried on, as that based on the lobster.

The methods of hatching, and of carrying the young as far as the lobsterling stage, having been well developed, it is now proposed to secure the cooperation of the lobstermen in rearing the small lobsters in enclosures or "pounds."



BROOK TROUT.

From a flash-light photograph.

SPRING FISHING IN NEW YORK BAY.

THE first signs that the angler's fancy has turned to thoughts of fishing are the inquiries at the Aquarium for bait. The Aquarium has no bait for sale, as all minnows and shrimps which are obtained are used to feed the big fishes. The angler can, however, get bait from boatmen in numerous places about the bay, and although the best local fishing is not to be had early in the spring, there is some good springtime sport.

The fishes available during the spring months, are flounders, tomcods, herring, striped bass, weakfish, blackfish, sea-bass, bluefish, fluke and eels.

About the 10th of May weakfish and sea-bass make their appearance, followed by the blackfish in quantities. Bluefish come in about the 15th of May, when they are taken entirely by trolling; lead and red-cedar squids being used. Several hundred, weighing from three and a half to four pounds each, are sometimes taken in a day by one party.

Weakfish are more numerous from the 15th of June to the 20th of July, when they are taken by hook in greater numbers than at any other time. During the months of April and May large quantities of eels are taken in near-by waters by bobbing. Sometimes during the month of May a few mackerel are taken, but the greater run is during the month of June. Flukes, or toothed flounders, are also taken in May and June by trolling with a live minnow for bait, dragged just clear of the bottom. Occasionally they weigh from eight to ten pounds,

and it has been a common occurrence for fishing parties to take several hundred pounds during a day's fishing. For most of these fishes, the baits provided by the boatmen, such as clams, worms, and small crabs, shrimp, killifish, spearing, etc., are good.

Atlantic and Navesink highlands, Sandy Hook, South Beach and other localities around Staten Island, Bayonne, Gravesend Bay, and Fort Hamilton, are all good localities for fishing. Boats cost from 50 cents to \$1 a day, and are necessary, as fishing from piers does not give much variety.

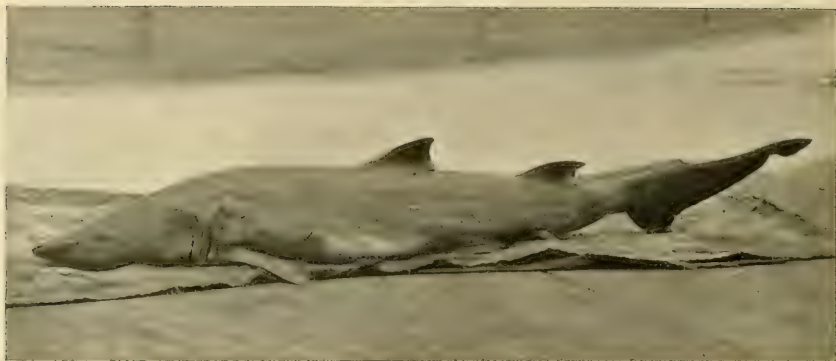
The fishing steamers Angler and Taurus, making daily trips from the Battery to the fishing banks off the Jersey coast, afford easy fishing excursions, as tackle, bait, and luncheon can be had on board.

FEES FOR MEMBERSHIP.

The fees for membership in the New York Zoological Society are as follows:

Annual membership.....	\$ 10.00
Life membership.....	200.00
Patron's fee.....	1,000.00
Founder's fee.....	5,000.00
Benefactor's fee.....	25,000.00

Information and blank forms for membership may be obtained at the Service Building, at all entrances to the Zoological Park, and at the Secretary's Office, No. 11 Wall Street, New York City.



SHARK CAPTURED NEAR SANDY HOOK.

THE TRANSPORTATION OF LARGE SHARKS.

WHILE the Aquarium has had no difficulty in transporting and capturing small sharks of four or five feet in length, the handling of large specimens has so far been unsuccessful. During the past summer four sharks, varying from eight to nine feet in length, were captured in pound-nets near Sandy Hook, and brought to the Aquarium. The method employed was to place each animal in a boat sufficiently large to hold it comfortably. This boat being placed in a large steam-launch and filled with water, was brought to the Aquarium as rapidly as possible. Although the water was changed constantly during each trip, only one specimen arrived in fairly good condition. This shark was a great attraction for about five days as it swam about the large central pool. After its death it was carefully examined and found to be, like the others, considerably bruised. Big sharks are so heavy, and offer such resistance during capture, that by the time they are brought under control, they are liable to have received injuries which they cannot survive. It is also possible that large sharks will not flourish in brackish water as well as small ones. The accompanying photograph of one of the specimens captured will serve to give an idea of their size. Big sharks do so much damage when they get into pound-nets, and are so ugly to handle that it is almost impossible to get the fishermen to treat them with the care necessary for an Aquarium specimen. They are also greatly

averse to retaining them in their nets long enough for suitable arrangements to be made for their transportation. Other big fishes, like sturgeon and drum, are easily handled and stand the transportation so well that there is usually no difficulty about keeping them permanently on exhibition.

The white whale is an air-breathing mammal which can be readily transported, and has been successfully exhibited at the Aquarium. Early last summer arrangements were made with the superintendent of a white-whale fishery on the St. Lawrence, for the capture of two specimens. The season passed, however, without any being secured, although acceptable prices were offered. The capture of white whales will be attempted again during the coming summer. It now seems possible to secure specimens of the dolphin or harbor porpoise. This species frequents in summer certain inlets of the Jersey coast, and an inducement will be offered to the local fishermen to undertake its capture.

SEA-FISHES AT THE AQUARIUM.

The sea-fishes exhibited at the Aquarium, with the exception of certain tropical species, are procured in local waters. They are supplied chiefly by the collector of the Aquarium staff, a smaller portion being purchased from New Jersey fishermen operating pound-nets near Sandy Hook, and



YOUNG STRIPED BASS.

from the steamer "Angler," which carries fishing parties from the Battery to the Fishing Banks.

Nearly all the species collected have their times of appearance and disappearance, so that the exhibits are varied, according to season, to an extent not generally understood by the public.

During the months of January, February, and March collecting is practically abandoned on account of the presence of ice along the shores. At this season the collector directs his efforts to the gathering of salt-water minnows, or killifishes, from sloughs, where, on account of the higher temperature of the water, due to the presence of springs, these fishes congregate in winter. Such localities are usually free from ice, and the fishes are often found in abundance living in water comparatively fresh. In winter killifishes constitute practically all the live food used in the Aquarium, as shrimps are then difficult to get.

In April and May a number of cold-water fishes, such as the muttonfish, blackfish, sturgeon, angler, herring, tomcod, eel, sculpin, sea-raven, lumpfish, toadfish, and sea-robin, are to be had in abundance and are nearly always on exhibition during the spring months. In June, July, and August other forms are available, among which may be mentioned porgie, weakfish, spot, sea-bass, bluefish, drumfish, dogfish and other small sharks.

In late summer and early fall, when the tempera-

ture of the water is high, a number of semi-tropical fishes appear; such as crevalle, moonfish, two or three species of filefish, rabbitfish, puffer, boxfish, pipefish, threadfish, shark-sucker, and pilotfish. Shark-suckers and pilotfish appear only when accompanying sharks that may wander in past Sandy Hook. In autumn many of the cold-water species, including different species of skates, which have sought deeper water during the summer, reappear along the shore and again become available. Striped-bass, various species of flounders, salt-water minnows, and a number of other

species, can be obtained at any season, when fishing is practicable. Many of the food fishes remain in New York Bay for long periods. The very interesting little sea-horse can usually be had from spring until fall, and is known to occur here in winter.

The majority of fishes brought to the Aquarium are procured from the numerous pound-nets in the region. The pound-nets located in Gravesend Bay, when in operation, are visited almost daily by the Aquarium collector. As the commercial fishermen are interested only in those species which are salable, a good many kinds useless to them, but interesting as specimens, are turned over to the Aquarium's representative, who naturally helps himself liberally. Certain fishermen in the vicinity of Sandy Hook are supplied with lists and sketches of desirable species, and notify the Aquarium when such appear in the pound-nets. These specimens are placed temporarily in floating fish-cars until they can be transported. The fishermen, of course, are compensated for services rendered to the Aquarium. Our own collector, who resides at Gravesend Bay, has a boat, nets, floating fish-car, and transportation tanks, and is otherwise equipped for carrying on his work. During transportation, if by wagon or train, the fish tanks are aerated by lifting the water frequently with a dipper. If they are transported by boat, the water is frequently changed.—*From the notes of W. I. DeNyse.*



LONG-EARED SUNFISH.

Photograph by L. B. Spencer.



SEA-BASS.

Photograph by L. B. Spencer.

Notes.

Pitcher-plant Mosquito.—Mr. J. Turner Brakeley, of Hornerstown, N. J., has very kindly supplied the Aquarium laboratory with numerous larvæ of mosquitoes. One species, *Wyeomyia smithii*, the pitcher-plant mosquito, winters in the larval stage, frozen solid in the small ice masses filling the pitcher-plants (*Sarracenia*). The eggs are hatched out in the autumn. The other species, *Culex canadensis*, the woodland pool mosquito, hatches from the egg at favorable times during the winter; the egg wintering in the mud at the bottom of the pool. The accompanying photograph shows the actual size of some of the pitcher-plants received from Mr. Brakeley. That portion of the leaf forming the pitcher is four inches long and one and a half inches diameter at the widest part, and may contain 75 to 100 larvæ. It is a satisfaction to be able to state that the pitcher plant mosquito is not a biting species.

* * *

Fish Hatchery.—During the second and third weeks of January the Aquarium fish hatchery was supplied by the United States Fisheries Bureau with many thousands of eggs of brook trout, lake trout, and rainbow trout, all of which hatched out before the end of February. White-fish eggs were also received in January, hatching out by March 16th. Eggs of the land-locked salmon arrived on March 24th.

A lot of sculpin eggs from Gravesend Bay, collected on January 1st, hatched in salt-water before the end of the month, but the young were lost, as no method could be found for feeding them. They were hatched in McDonald jars, like the whitefish.

The brook trout—passed along into the rearing boxes—have already absorbed the yolk sac and are beginning to feed; the other trout are not so far advanced. All young

fry, when ready for transportation, will be turned over to the New York Fish Commission for planting in State waters. The exhibition tanks now contain yearling and two-year-old brook trout, rainbow trout, brown trout, Atlantic salmon, and whitefish; also yearling lake trout and quinnat salmon, all from our own hatchery. These home-raised fishes are better for exhibition purposes than wild specimens.

* * *

Fish Trade of New York City.—The wholesale trade in fishery products in this city constitutes a business of greater proportions than the public is generally aware of. Omitting the retail business entirely, the amount of fish, oysters, clams, lobsters, etc., brought to the city from various sources is worth over \$13,000,000 a year.

* * *

Nova Scotia Trout.—The fine collection of sea-run brook trout from Nova Scotia, recently exhibited at the Sportsmen's Show, is now in the New York Aquarium, having been presented by Mr. D. G. Smith, Fishery Commissioner for New Brunswick. Most of the northern trouts take to salt-water at times, when they are known as "salmon trout."

* * *

The director and staff of the Aquarium disclaim all responsibility for misleading articles in the daily press, respecting the Aquarium.

It should be stated that the fishes in the building are *not* going blind, as recently reported, and that there are only five cases of blindness in the entire collection of over 2,000 fishes. Four of these are due to injuries received during shipment, and the specimens are only temporarily blind. When merely the surface of the eye is injured, fishes recover their eyesight. This trouble is well understood at the Aquarium.



PITCHER-PLANT.

Photograph by L. B. Spencer.

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July, 1905

THE NEW BIRD HOUSE.

By C. WILLIAM BEEBE,

CURATOR OF BIRDS.

THE new Bird House in the Zoological Park will be opened to the public on July 1st. From an aesthetic and utilitarian point of view, there is no doubt that it excels most other buildings of its kind in the world. The most necessary requirements for the successful keeping of birds are

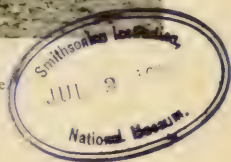
fresh air, light and plenty of room, and in the planning of this building, these desiderata were never out of mind.

The building consists of two large exhibition halls, built in the shape of an L, one of which, the parrot room, measures sixty-five feet long by fifty



THE NEW BIRD HOUSE FROM THE SOUTHEAST.

The Glass Court, soon to be constructed, will fill the unoccupied angle





MAIN HALL OF THE NEW BIRD HOUSE.

Showing a portion of the Flying Cage.

feet wide, and its height to the peak of the roof is about thirty-six feet. The roof itself is one of the most novel features of the building, being entirely filled with glass, thus giving the impression of a great conservatory. Indeed, it is intended that a large number of plants and vines shall be grown in the interior, thus happily combining a profusion of flowers with brightly-colored song birds.

The ribbed character of the glass diffuses the direct rays of the sun, and moderates the glare which would inevitably result were the roof of clear glass. Fresh air is secured by the presence of thirty-four large windows in the walls, besides which, no less than one hundred and sixty-four panes of roof glass, each measuring about five feet in length, are made to lift at one end. So much for fresh air and light.

The two exhibition halls are lined with spacious cages, nine to twelve feet in height and from four to eight feet square. Almost without exception, the rule in the various large aviaries of zoological gardens generally, has been to provide large numbers of small cages, each intended to hold some one species. In the present building this has been reversed, the cages being adapted for large groups, either representing a single species or several. This plan has proved very successful in the case of the larger water birds, and it is a dominant factor in the

beauty of arrangement and general open air appearance of this new Bird House.

But the largest of the side cages dwindles in comparison with the great central flying cage, which measures fifteen by thirty-six feet, and is almost twenty feet high. It is provided with a large bathing pool, fed by a fountain, the water varying in depth from four inches to one and one-half inches.

Besides the indoor cages there are nineteen outdoor enclosures for the hardier birds, which make their homes in cold regions, or for those tropical species, which easily adapt themselves to our rigorous climate. There are, altogether, eighty separate cages.

The most striking of the many appropriate decorations, to the planning of which infinite thought has been devoted, is a continuous terra-cotta frieze of cockatoos, extending entirely around the building. Every alternate bird has its crest and wings raised, while the corners of the building are marked with figures of great horned owls. The pillars at both the east and south entrances, are ornamented with the heads of owls and macaws.

There are many ingenious devices which have been planned especially for this building. The doors of the cages are all at the back, opening into a keepers' passage which extends around the entire



PARROTS' HALL IN THE NEW BIRD HOUSE.

View looking toward the Main Hall, showing a number of the wall cages.

building. This makes it possible to keep all the cleaning operations out of sight, and also permits the keepers to have access to any of the cages, without disturbing the visitors in front.

Each cage has its separate drinking and bathing basin, controlled by individual water pipes.

The mesh of the cage wire is another radical departure from the usual aviary, being very large, and wherever possible composed of horizontal and vertical wires. The intention is to give as unobstructed a view of the birds as is possible, without allowing them to escape through the wires.

A dumb-waiter, for carrying sand or grain, leads down into the cellar, whence an underground tunnel extends to the outside roadway. By this means a cart can drive into the cellar itself, bringing grain or other supplies, and carting away ashes and refuse.

At the north end of the building is the office of the Curator, and above this a second large room—a glass-roofed laboratory. At the south end of the building are the keepers' and feed rooms, while three additional rooms overhead are of the utmost value as hospitals and as breeding rooms for the more timid species of birds.

Such is a bird's-eye view of the building. The success of its various new features could not be foretold until the birds themselves were introduced. Taken from the small, dark, temporary cages, in which they had spent the winter, and set at liberty in the spacious enclosures of the new building, the effect was almost magical. Birds are the very antitheses of stoics; and their delight in the warm flood of sunlight and in the running water, room to spread their wings and fly again, was pathetic in its excess.

Birds, which for months had hardly uttered a chirp, now burst into song. They bathed and bathed again, spread wide their wings and tails upon the warm sand, or preened their plumage, until every feather was clean and in place.

No attempt has been made to fill all the cages with the birds procurable at short notice. On the contrary, a

careful selection is being made. Even now many of the cages are vacant and will remain so until young and healthy birds can be purchased or collected.

One of the large halls has been given the name of parrot room, but only the more beautiful and typical of this class will be exhibited; the intention being to avoid the large series of these birds, which not only closely resemble each other, but by their screams make the average parrot house of a zoological garden a perfect Babel.

Even in the mere nucleus of a typical collection one cannot fail to marvel at the wealth and beauty of form, so characteristic of this tropical Family. Compare the tiny *toyi* parakeet—an absurd pinch of green feathers uttering its insect-like chirps—with one of the giant macaws, thirty-six inches of blue and yellow and red, with a voice, which in the



GREAT SULPHUR-CRESTED COCKATOO.

echoing canyons of its native haunts, carries for miles. Five hundred species the entire Family reckons, embracing the macaws, the parakeets, the brilliant lories, the green-garbed Amazons and, most beautiful of all, the cockatoos. Hardly a fortnight had the grass parakeets been in their new home, the Bird House, before they began nesting in a hollow stub. The breeding of birds of this group will interest many; parrot's eggs being to most of the visitors, almost as unusual a phenomenon as "hen's teeth!"

While it is planned to have vines covering the walls of the parrot room, and plants and flowers over-arching the cages, yet the propensity of these birds to gnaw and whittle with their powerful beaks will prevent any special decoration of their enclosures. Much more can be done in the cages of the other birds for which this building is intended, although it will be several months before the experiments which are being carried on will be completed.

The series of cages, occupying the north-east side of the main hall, are devoted to the smaller finches and weavers, most of which come from Africa. As yet but few have been placed in the collection, although even the most common are interesting—the Madagascar weaver-bird in its plumage of flaming scarlet, the cut-throat, so called from a band of crimson feathers across its throat; the mannikins, white-headed, black-headed and others, looking more like little wooden images than like birds; and the little striped zebra finches, weaving madly for a few minutes, and then climbing into their half-made nest to rest.

Here is a whole flock of strawberry finches, so named from their color and from the seed-like white

dots which fleck their plumage. Indeed they scarcely exceed a large berry in size! Most exquisite little fellows are the bib finches in liveries of mauve and black.

A cage of beautiful "Japanese robins" fill this side of the hall with their soft, sweet warbling. They are one of the few fortunate creatures which have been endowed by Nature with a plethora of delightful characteristics—plumage, song, form, all are admirable. The law of compensation has passed them by.

Several cages are given up to the more common birds of Europe, and again and again one hears loud exclamations of delight, in many tongues, so potent is the form or song of a bird to revive old memories. To us, the English robin redbreast, warbling softly from his perch among the green leaves, is but a new and interesting bird with a pleasing song: to the unknown visitor passing at the moment it may be a talisman, awakening half a lifetime of memories. Similarly the chaffinch, greenfinch, bullfinch, linnet, nightingale and thrush are here at home and in song. It is pleasant to see the wonder and interest of a crowd of people around the cage of a roaring lion or a chattering monkey, but it is better still to see the moist eyes and intent delight of the same people when they are held by the song of a little bird of the Vaterland. An excellent place to read character, this—in front of the redbreast's cage.

The collections are as yet far too incomplete to foretell the ultimate disposition of the various groups of birds. The mynahs of India are well represented—sleek of coat, liquid of voice, with as excellent possibilities for acquiring human words and



TOCO TOUCAN.



PARROTS' CAGE.

Showing the open character of the mesh of the wire, which is used in the cage fronts.

phrases as any parrot. The starling-like pastors and the active jays are housed here, as are also the rollicking laughing thrushes of the Himalaya mountains. Now and then the coo of a tiny ground dove is heard, and sooner or later the deep ventriloquial bass of a great crowned pigeon reverberates through the building. Not one person in a thousand can trace it to its source—to those great purple and blue birds, with their wonderful martial crests, well deserving their title "king of the pigeons."

Among other groups of birds, which will soon find homes in this beautiful building, may be mentioned the thrushes, warblers, titmice, bulbuls, orioles, tanagers, buntings, grosbeaks, waxbills, sparrows, starlings, bower-birds, crows, jays, larks, hornbills and toucans, woodpeckers, cuckoos, kingfishers, fruit pigeons and doves; the smaller quail and partridges, sand-grouse, tinamous, the sand-pipers and plover, and many others.

The middle flying cage, with its fountain, its wide-branching trees, its rocks, sand and growing plants, is the most striking and beautiful exhibition of all, vying in interest with the great outdoor flying cage of the aquatic birds—save that here everything is in miniature.

When a pail of minnows is liberated in the pool, a thrill of excitement passes through the whole cage.

A dozen terns—those swallows of the sea—uttering their tremulous cry, rise on fluttering wings and swiftly fly through and over the branches, now hovering over the surface of the water and dashing down for a fish, now swinging rapidly toward the opposite end of the enclosure. These little fellows, reared from chickhood in captivity, are as strong and happy as if they were darting over the sand dunes of the Virginia coast. The skimmer, too, with its strangely uncouth bill, lives here contentedly. Although one of the most specialized of all our native birds, yet in captivity it has learned to pick up its food, to fly and to give the various call notes of its kind.

The mention of these American birds brings to mind the fact that in this country we have a splendid and interesting *avifauna*, many members of which would well repay rearing and breeding in confinement; and, although European and other foreign birds will always be largely represented, yet it is hoped that, little by little, a representative collection of North and South American birds can be assembled, which in interest, both

scientific and popular, will be unsurpassed.

At present the skylarks in the central cage sing upon the wing as sweetly as any poet of England ever heard them; the nightingales are just coming into song; but although enshrined and made famous in the literature and romantic folk-lore of many centuries, yet we can match, if not indeed surpass, every one of them with songsters from our own continent. What land can produce a song as full of rollicking joy as that of the bobolink? What a choir of pure and liquid voices we have in our thrushes alone—the wood, the olive-backed, the grey-checked, the hermit and the veery! And thus we could run the gamut of our native choristers, through the clear-toned sparrows and orioles, the wild music of the meadow larks of the West, and others innumerable, up to the leaders of their class

the mocking-bird and the solitaire—the *jilguero* of the Mexicans. When, in one building, one may listen to the song of the varied thrush, bringing to mind the spruces of Alaska; to the solitaire, whose song is the embodiment of fern-scented tropical canyons; when as to-day, we see the snowflake and the honey creeper happy and content under a single roof, then the marvel of the bird-life of our continent becomes more real to us than museum or book could ever make it.

includes a map of approximate distribution, and a portrait for the identification of the individual referred to. Of course, the lifetime of any painted label in a climate as changeable and severe as that of New York can hardly exceed two years.

Thus far it has proven a difficult matter to find a colorless varnish which will not crack under the extremes of heat and cold.

Indoors, the providing of printed labels under glass is merely a question of labor and expense; but, as in museums, it is impossible to provide descriptive labels for very many of the small species. Our efforts are necessarily confined to the species that are of commanding importance, and to the most interesting groups.

We show herewith examples of descriptive labels such as have been provided for the Bear Dens, Ostrich House and Reptile House. These, of course, are permanent. We have attempted various things in labels for the large hoofed animals of the temperate zone, permanently quartered in the open air; but even our specially-designed water-proof, moisture-avoiding metal frames for ungulate labels printed on



DISTRIBUTION OF THE POISONOUS SNAKES OF THE OLD WORLD

REPTILE HOUSE LABEL.

paper are only partially successful. At present, in our label-making problems, we can only renew our resolves to resolve all our difficulties, and keep on trying.

W. T. H.

New Animals.—During the past fortnight, a number of rare animals have arrived. From Buenos Ayres, South America, the Steamer Coronda brought us a great ant-eater, two fine capybaras, a pair of guanacos, an adult specimen of one of the largest species of South American deer, three eight-banded armadillos, and two specimens of Azara's dog. The birds in this shipment consisted of two crested screamers, three black-necked swans, two tree-ducks and three rosy-billed ducks. Of this entire lot, all the species represented, save two, are new to the Zoological Park collections.

Our collection of Asiatic deer has been strengthened by the arrival, direct from the jungles of Lower Burma, of a fine adult pair of Burmese brow-antlered deer, or thameng (*Cervus eldi*), characterized by antlers that describe almost a half-circle, and possess a very long brow-tine. This species has long been desired, and the specimens now in hand, and another female to arrive in July, are a special gift from Mr. William Rockefeller.

For the collection of small carnivores in the Small Mammal House, we have secured an adult pair of black-footed ferrets (*Putorius nigripes*), a species which probably never has been exhibited in captivity outside of Washington, Philadelphia and New York. This animal frequents the prairie-dog towns of western Kansas and Nebraska, and is often called the "prairie-dog hunter." It was discovered in 1851 by Audubon, but the only skin soon disappeared, and the species remained lost to science until about 1887, when it was re-discovered.

For the first time since the Zoological Park began we have living specimens of *Siren lacertina*, or the miscalled "Mud-Eel," of the South. This is the eel-like amphibian which has only one pair of legs, situated near its head. The collection of poisonous serpents has received four very large cobra-de-capellos, a full-grown king cobra, and fourteen rattlesnakes from the New York and Massachusetts boundary. A collection of desert lizards and horned "toads" has been installed in a case, in front of the Reptile House.

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EDITED BY THE DIRECTOR

Elwin R. Sanborn, Asst. Editor.

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PROTECTION TO WILD LIFE.

Ever since its incorporation the Society has actively engaged in game-protection work, and with the policy in view of making a more vigorous future campaign, has appointed Mr. G. O. Shields, formerly editor of *Recreation Magazine*, as its special agent for game protection.

During the past two years very important work for bird protection has been accomplished, through the income of an endowment fund given by Miss Caroline Phelps Stokes to the Zoological Society, for use only in the cause of bird protection.

The first expenditure from this fund was utilized in printing a special edition of 3,000 copies of the Director's "Report on the Destruction of Our Birds and Mammals," a pamphlet which has been in great demand by teachers and by persons seeking to secure the enactment of better laws for game protection. Two thousand copies of this reprint were distributed throughout the United States, generally, and, at the request of a member of

Congress, copies were sent to all members of the Senate and House of Representatives.

During the recent struggle in Texas for the enactment of better laws for bird protection, copies were sent to all members of the State Legislature, and the resulting victory by the bird-protectionists was partly accredited to this literature.

In 1904 Mr. Shields was sent to New Orleans for the purpose of rendering active assistance in securing the passage by the Legislature of better laws for the protection of birds. Mr. Shields appeared before the State Legislature, and addressed both of its bodies, as well as the Committees having in charge the bill in behalf of the birds, and made other addresses in various places in Louisiana.

Altogether, the result of the campaign was most gratifying, and the work which Mr. Shields accomplished has proven of permanent value. The State of Louisiana has long lacked proper bird laws, and the result has been that an immense number of song birds, not to mention water-fowl, have annually been slaughtered. The Society defrayed the entire expense of this trip from the Stokes Fund.

Early in 1904, the attention of the Zoological Society was called to the fact that certain manufacturers were about to put upon the market an automatic double-barrel shot-gun, of great destructive power, when brought to bear against birds. The idea of a machine-gun for the slaughter of birds caused the Zoological Society great concern, and when Mr. Shields appealed to the Society for funds with which to print 10,000 copies of a pamphlet protesting against the automatic gun, for special distribution among the members of State Legislatures, the Society appropriated \$100 for that purpose. The pamphlet was printed to a total number of 10,000, and a copy was sent to each member of every State Legislature in the Union. This required about six thousand copies, and to supply the number of extra copies that were called for by State Legislators, about one thousand additional copies were sent out.

Mr. Shields had planned to make a vigorous personal campaign in several states against the automatic gun while law-making bodies were in session, but very unfortunately, the amount of money that he had personally expended in game protection led to his being thrown into bankruptcy in January, 1905, and the loss of his game-protection magazine. In order that he may continue this work, the Executive Committee has made the appointment mentioned above, and its members have individually subscribed a substantial sum toward the financing of *Shield's Magazine*, which, of course, will be largely devoted to the cause of game protection.

E. R. S.



SUNDAY AFTERNOON IN THE ZOOLOGICAL PARK.



IN LINE FOR THE RIDING ANIMALS.



BORDER PLANTATION OF CONIFERS.

On the southern boundary near the Southwest Entrance

TREE-PLANTING IN THE ZOOLOGICAL PARK.

TO every large city, every park which is to any extent a natural wilderness is an asset of priceless value. In cities of the first rank, there are very few park areas sufficiently remote from the dust and roar of traffic, and the sight of buildings, that the tired city-dweller can find within them any suggestion of woodland seclusion. In the possession, in Bronx Park, of these very elements, the City of New York is particularly fortunate.

Ever since the New York Zoological Society assumed the responsibility of protecting and preserving the splendid forest area of the 261 acres now comprising the Zoological Park grounds, it has been conceded that extensive efforts in planting would be imperatively necessary to shut out the cheap buildings of the city from overlooking and practically dominating the interior of the Park along its southern and western borders.

Along the southern boundary, for a distance of more than 2,000 feet, the buildings that will shortly be erected on the high ground of West Farms Hill

will completely overlook the lower grounds of the Park. Excepting the grove which surrounds the Antelope House, the whole southern boundary of the Park is mercilessly exposed. The western boundary, which has a length of 2,750 feet, is but little better off. Already three-story tenements along the western side of the Southern Boulevard begin to wall in the Park grounds, and the few fine maples that until now have shaded portions of the Southern Boulevard are in imminent danger of being killed by the recent grading, regulating and filling-in of that thoroughfare.

During the past three years, the forestry force of the Zoological Park has each year done a considerable amount of planting, for the purpose of securing what are known as "border plantations," but, in comparison with this year's operations, all previous work has been on a small scale. Having fortunately secured from the Board of Estimate an appropriation sufficient to permit of the extensive planting operations which the Society has long had in

view, the Executive Committee made haste to carry out their long-cherished plans.

Under the direction of Mr. James L. Greenleaf, Consulting Landscape Architect, border plantations aggregating nearly 6,000 feet in total length were laid out along the southern boundary of the Park, from the Boston Road to the Southwest Entrance, up the Southern Boulevard to the Northwest Entrance, and thence along the bank of Cope Lake to the Pelham Parkway bridge. Mr. Hermann W. Merkel, Chief Forester of the Zoological Park, who directs all planting and forestry operations, was instructed to visit all the nurseries in the eastern United States which seemed likely to yield satisfactory stock for the contemplated plantings. Altogether about fifteen nurseries were visited by him, and nearly fifty carloads of choice trees and shrubs were selected and purchased for immediate delivery. A force of nearly one hundred picked men was gathered under the most skillful foremen gardeners that could be secured, and put to work preparing the soil for the planting. The spaces to be filled were plowed up and carefully worked over, and great quantities of top soil were purchased and distributed.

In the purchase of stock for the present year's work, special attention has been paid to conifers, for the reason that they are needed to shelter the Park from the fierce winds of winter, and from the dust clouds of summer, quite as much as to screen the Park from outside domination.

The principal evergreens selected and planted have been pines and hemlocks, of various species, to give height to the mass, and spruces, firs and cedars, to give density and variety. Owing to the sweep of the winds of winter from the south and west, the unforested area of the Zoological Park is very bleak and cold. The border plantations now being developed, will prove of immense value in improving this undesirable condition.

Along with the conifers, there have been introduced a liberal number of deciduous trees, such as red oak, swamp oak, a few white oaks, chestnuts, black and white ash, silver, Pennsylvania, red and sugar maples, white and paper birches.

During the past four years, the planting operations in the interior of the Park have made steady progress. The great object aimed at has been to make good the losses to the forest that have been caused by wind storms, and by the death of trees through old age, or from thinness of soil. To this end, great numbers of oaks, poplars, chestnuts, pines, hemlocks and maples have been scattered through the grounds, where Nature originally had planted forest trees.

Along the unshaded walks, in the southern portion of the Park, shade-trees were planted in the years 1900 and 1901, and already are rendering good service. The most of these are quick-growing maples and poplars, which are destined to be cut

out later on, when the permanent oaks, tulips and elms attain satisfactory height.

Along the forest walk leading from the Primates' House to the Southwest Entrance, and known as Beaver Valley Walk, some excellent work has been done. On hill-sides that originally were bare, and where much of the forest vegetation had been trodden out, there have been placed under the lofty forest trees extensive plantings of three species of rhododendrons, azaleas and a well-chosen assemblage of such shrubs and ground-plantings as yellow-root, galax, trailing arbutus, periwinkle and rhodora. To several spots which once were beautifully ornamented, masses of ferns were restored. The steep hillside immediately below the Rocking-Stone Restaurant has been almost covered with mountain laurel, and already the effect is very fine. In a comparatively short time, Beaver Valley Walk will be one of the most beautiful sights of the Zoological Park.

The area north of Beaver Valley Walk, comprising about forty acres of beautiful woodland, contains the densest and most heavily-shaded area in the Zoological Park. Once this locality, familiarly known as "The Beech Woods," was celebrated for its wild flowers; but before these grounds were allotted to the Zoological Society, the tender undergrowth was seriously damaged by visitors. Owing to the unfinished condition of Baird Court, and the fact that no entrance from the northeast has been possible, this area has lain untouched and untrodden, fenced off by guard-wires, and traversed only by one or two narrow foot-paths. During this interval, the wild flowers have come back to an astonishing extent, and this spring the ground has been thickly carpeted with violets, hepaticas and spring-beauties. The ferns are reappearing in their original number, and the dogwood's blossoms are unplucked.

In view of the approaching completion of Baird Court, the Executive Committee of the Zoological Society has ordered the construction of walks through this woodland area, chiefly in order that visitors may have an opportunity to enjoy the charming verdure. As soon as the walks can be constructed, the Northeast Entrance will be opened to visitors, after which this area will constitute one of the finest woodland attractions of the Zoological Park. The open space on the plateau between the Beaver Pond and the Northeast Entrance will be utilized as a play-ground, but the beautiful vegetation which surrounds it will be protected by the usual guard-wires. To children and young people, this will undoubtedly become a very attractive spot.

On the completed portion of Baird Court, shade-trees have already been planted. The species chosen by Mr. Greenleaf is the European linden, which is expected to yield sufficient shade, without completely over-shadowing the whole of Baird Court.



RHODODENDRONS ON BEAVER VALLEY WALK.

In Audubon Court, which comprises the space bounded by the Reptile House, the Antelope House, Mountain Sheep Hill, and the Ostrich and Small Mammal Houses, the existing grove has been extended southward and westward, for purposes of shelter and shade. Only native species, such as elms, dogwoods and hornbeams, have been introduced, and the whole area will eventually resemble a natural grove. The oval in the walk leading from the Reptile House directly to the Antelope House, which already contains several fine trees, is being filled with fancy evergreens, laurel and hybrid rhododendrons.

The cold and backward spring has been particularly beneficial to the planting operations in the Zoological Park. Because of the unusual delay in the approach of hot weather, it is expected that the results of the recent planting operations will prove very successful.

The total plantings for the present season have been as follows:

Evergreen Trees.....	4,760
Deciduous Trees.....	585
Vines and Shrubs.....	13,450
Perennials.....	5,475
Ferns.....	500

Evergreen Shrubs:	
<i>Kalmia latifolia</i> , 5 carloads.....	2,000 Plants.
<i>Rhododendron maximum</i> , 7 carloads	1,050 Plants.
<i>Rhododendron catawbiense</i> , 1 carload	500 Plants.
Total	28,326

W. T. H.

New Walks.—Under the supervision of Chief-Constructor Merkel, 45,500 square feet of splendid Telford macadam walks have been made. All of the old walks have been re-constructed, and several new ones staked out for construction in the near future. Audubon Court is completely transformed and, with the plantings and new paths, is one of the brightest spots in the Park.

FEEES FOR MEMBERSHIP.

The fees for membership in the New York Zoological Society are as follows:

Annual membership.....	\$ 10.00
Late membership	25.00
Patron's fee.....	1,000.00
Founder's fee.....	5,000.00
Benefactor's fee.....	25,000.00

Information and blank forms for membership may be obtained at the Service Building, at all entrances to the Zoological Park, and at the Secretary's Office, No. 11 Wall Street, New York City.



MARINE TOAD.

A New World species, of large size.

OUR SERIES OF BATRACHIANS.

BY the addition of jars containing tadpoles of the various species of frogs, thus illustrating the transformation of the *Ecaudata* or tailless Amphibians, the representative series of Batrachians in the Reptile House is now very complete. To further increase the value of this collection for study, charts of classification, descriptive labels, and colored maps showing distribution, are now in course of preparation.

The collection now embraces representatives of most of the important families comprising the Batrachians, among which the series of frogs is possibly the greatest source of popular interest. The various local species, some of which are very striking in their coloration, are exhibited in a series of table cases. Accompanying each case is a jar containing tadpoles of the species involved, and a descriptive label giving the life history, general habits and distribution. Of the Family *Ranidae*, the frogs generally, the following species are on exhibition:

Bull-Frog (*Rana catesbeiana*);
Common Frog (*R. clamitans*);

Leopard Frog (*R. palustris*); Salt-Marsh Frog (*R. virescens*), and the Wood-Frog (*R. sylvatica*). The Bull-Frogs are among the few noisy inmates of the Reptile House. Their loud bellowing is a frequent and cheerful sound, and in alternation with the thunderous voices of the big Crocodilians, breaks the monotony of silence that reigns among the five hundred scaly inmates of the building.

The Tree-Frog Family, *Hylidae*, is represented by four species, two of which are not generally seen by the average visitor, owing to the remarkable similarity of the Batrachians to the bark or vegetation upon which they may be resting. These are local species, the Gray Tree-Frog (*Hyla versicolor*) and Pickering's Tree-Frog (*H. pickeringii*). It is the latter species that heralds the first warm days of spring with a vociferous piping call from the marshes, in sounds which are quite out of proportion to the diminutive cause. Another interesting species on exhibition is the California Tree-Toad (*H. regilla*), a creature of most variable color and pattern. Our specimens occasionally chatter harshly, and their cries resemble the scolding of a red squirrel.

Of the Toads, Family *Bufo*nidae, the Reptile House possesses a fine colony of a giant species known as *Bufo* *agui*a—a species of semi-tropical and tropical latitudes of the New World. Some of the specimens are as large as bull-frogs. Their very



CALIFORNIA NEWT.

A large and showy species.



CALIFORNIA TREE TOAD.

A species of variable color and pattern.

THE WHITE GYRFALCON.

The beautiful white gyrfalcon—the spectral hunter of the Arctic regions—is now represented in the collection of the New York Zoological Park. This bird is one of the only two living specimens of its kind known to be in captivity.

As the falcons are the noblest of the hawks, so the gyrfalcon is the king among falcons. The specimen which may now be seen in the Zoological Park was picked up at sea, 800 miles off the coast of Newfoundland.

Where “the northern lights come down o’ nights” the gyrfalcon makes its home, never wandering southward, save when driven in the teeth of a raging storm, too terrible for even its courageous spirit to resist. Living as it does far north of the tree line, the gyrfalcon places its nest of sticks on a high rocky cliff—perhaps overlooking the Norwegian Sea, or facing the hoisterous waves which roll in toward the Iceland coast. Here, too, innumerable specimens of water-fowl come to breed; and many a gull, guillemot, duck or plover gives up its life that the young gyrfalcons may grow bigger and stronger. The Arctic hare shrieks as it is snatched from where its shadow betrayed it—snatched by a winged terror, so white and so swift of flight that it seems to have no shadow. Thus the gyrfalcon seeks its prey—even the cubs of the snarling Arctic fox mother not being safe from this feathered death.

In the case of the ptarmigan—it is white matched against white, keenness of eye against cunning. As the gyrfalcon is snow-white, that it may the more surely rise in air, hover a moment and drop with unerring aim upon its prey—so the ptarmigan,

flat bodies and huge parotid glands impart a grotesque appearance. Besides these creatures, our common toads, of which there are always several hundred specimens on exhibition, appear quite in significant.

The collection of the *Urodela*, or tailed Batrachians, in the Reptile House is of considerable interest to the student. Among the aquatic forms exhibited are the *Amphiuma*, or Congo “Snake,” (*Amphiuma means*), of the southern United States; the Hellbender (*Cryptobranchus allegheniensis*), of the Lake Region, and the Japanese Giant Salamander (*Cryptobranchus maximus*). The latter species is as ugly in disposition as it is repulsive in appearance. Adjoining the aquaria containing these species are the newts, among which are species from the eastern and western United States, and from Europe. Among these the most showy are the large Californian Newts (*Diemictylus torosus*), which are cannibalistic, and necessarily occupy a tank by themselves.

R. L. D.

that it may the better escape the ever vigilant eye of its archenemy, the falcon—has taken on the white of the surrounding snow.

C. W. B.



GYRFALCON.

Flew aboard the S.S. Citti di Milano, 800 miles at sea off the coast of Newfoundland.

narrow part of the cage, and finally tied up against the bars. With a pair of large forceps, Dr. Blair succeeded in pulling the lip over the tooth. It left but a slight wound, which healed quickly.

The Serval's Accident.—Animals in captivity make all the trouble for themselves and their keepers that is possible for them to make. If there is the slightest crevice in the wire or iron-work, through which even a mouse would not attempt to go, the animal will concentrate its undivided attention upon that point, even if he is as large as a buffalo, and his neighbor in the adjoining enclosure is always there ready to add to the trouble. Human ingenuity has exhausted itself in the effort to make the new Mammal House as nearly perfect as such a place needs to be. Yet the serval found a three-quarter-inch opening through which he thrust his right foreleg, with the result that an osseous on the other side seized the leg and splintered the end of the radius.

The animal was captured and the leg was put into plaster bandages so that a complete reduction of the fracture was made in about ten days.

* *

The Increase of Birds.—All of our common birds seem to have arrived at one conclusion—that the Zoological Park is a haven of refuge and a place in which to rest and rear their young in absolute peace.

Every clump of bushes sends out a contribution of song, and every tree seems a harboring place for a different species.

Three robins have nested in the pavilion between the Mammal and Ostrich Houses, so close together that a newspaper would cover the three nests. Another has built over the door of the conservatory, in a place so narrow that the female had hardly room to hover her young, and in a position so exposed that one might reach out and touch the bird.

Golden-winged woodpeckers, scarlet tanagers, thrushes, and cat-birds are frequently seen; and grackles, blackbirds, starlings, song sparrows and white-throated sparrows are really common. Considering the enormous amount of work going on throughout the Park, which might naturally frighten the birds, there has never before been so great a variety of species, nor such an abundance of individuals and of bird songs.

E. R. S.

GREAT SULPHUR-CRESTED COCKATOO.

Notes.

Nesting Cranes.—The two sandhill cranes, which are now counted among the oldest inhabitants of the Park, have again nested, and it is hoped that no disturbing elements will prevent the young birds from hatching. Both cranes are valiantly defending the nest, and if courage can be reckoned as a favorable factor, this very unusual event will soon take place.

* * *

The Porcupines.—The Society has just added to the collections of the Mammal House a fine specimen of the African or crested porcupine. Next to the beaver, the African porcupine is the largest of the Old World rodents. The great crest of white, coarse hair, which it raises at will, and the enormous length of the quills make this animal one of the most interesting of the Society's exhibits. In great contrast to this specimen are the Canada porcupine and the crestless porcupine exhibited near by.

* * *

Attendance. The attendance at the Park during the month of April exceeded the same month of the previous year, by a wide margin. Owing to the inclemency of the weather, May showed a slight decrease. The number of visitors on Decoration Day was, in round numbers, 30,000. Thus far June has gained considerably over all former years.

* * *

A Peculiar Injury.—Aside from a few domestic outbreaks of a comparatively mild kind, our bears live a contented and peaceful life. In the early part of June, however, one of the Russian brown bears and the male hairy-eared bear engaged in a scuffle from which the Russian emerged with a most peculiar injury. In some manner the upper lip was pierced by one of the canine teeth in such a way that the bear could not disengage it.

A shifting cage was brought, and the injured bear quickly transferred to the hospital-yard cages. Here he was confined in a



CHEETA.



TOCO TOUCAN

The Seriema.—A bird without a common name and almost without a classified place among his brethren, is the seriema, and yet one with so kindly a disposition—almost worthy the adjective genial—that we long for some besides the Portuguese one which he bears.

He comes from South Africa—the open plains of Brazil—where with his mate he builds his home about six feet from the ground and incubates his two eggs. In appearance, the seriema is an ornithological puzzle. His legs resemble a plover's or crane's, his body is rather similar to that of a bustard, his digestive organs exactly like those of a heron, and his beak and bones very hawk-like; while if we step back and take a general survey of the bird, another strange species, the secretary-bird of Africa, is brought vividly to mind. Even his toes are unlike each other, the second on each foot bearing a sharp, curved, talon-like claw, like that of a hawk or eagle, which preserves



CANADA PORCUPINE.

He once bent a key and again broke one, showing the strength which he exerts.

C. W. B.



AFRICAN PORCUPINE.

This species is particularly striking on account of the large crest of coarse white hair.

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THE AFRICAN ELEPHANT

AFTER a considerable period of waiting, the Zoological Society is at last in possession of an elephant from Africa. On July 25th a fine male specimen arrived from the French Congo country, West Africa, and entered the Park as the gift of Mr. Charles T. Barney, Chairman of the Executive Committee. It is specially distinguished by the roundness of its ears, and their small size in comparison with those of other African elephants.

In the few portions of Africa yet inhabited by wild elephants, conditions are so difficult that the capture of even a baby elephant, its upkeep in the jungles for four months, and its successful transportation to the coast, are matters of great difficulty. During the past four years Mr. Hagenbeck's agents in the field have captured two small East African elephants for us, but both died before reaching the coast.



INDIAN ELEPHANT "GUNDA" AND AFRICAN ELEPHANT "CONGO."

The photograph shows the marked difference in the contour of the head.



AFRICAN ELEPHANT "CONGO."

Showing the small rounded ears and the downward curve of the tusks.

It was with great surprise, and also pleasure, that last June we learned by cable that a small male elephant, from the French Congo territory, West Africa, had arrived for us in Mr. Hagenbeck's great live-animal establishment at Hamburg. Without delay it was shipped to New York, and reached the Zoological Park in excellent condition. This animal, which has been christened "Congo," stands forty-three inches in shoulder height and weighs precisely 600 pounds. Its tusks are about four inches long, and at present show an odd tendency to curve down rather than up. As nearly as we can estimate, "Congo" is between two and three years old, and therefore, in comparison with the gigantic East African species, is small for his age. But this species is said to be, when adult much smaller than those of East and South Africa.

In the year 1900, Professor Matschie of the Berlin Museum of Natural History, finished a special study of the African elephants, and published his conclusions. He recognized four species as follows:

Elephas cyclotis, Matschie. Cameroons, West Africa.

Elephas oxyotis, Matschie. The Soudan.

Elephas knochenhaueri, Matschie. German East Africa.

Elephas capensis, Cuvier. South Africa.

The specimen now exhibited in our Antelope House, next to the Indian elephant, no doubt represents the species at the head of the list, *Elephas cyclotis*.
W. T. H.

Sea-horses.—Sea-horses having for some reason become difficult to procure in New York Bay, have recently been collected with seines, in the bays back of Atlantic City. There are now about a dozen specimens in the building.

The Bird Collections.—During the last few months there has been a remarkable increase of numbers and species in the collection of birds. A rough calculation shows about eleven hundred individuals as compared with 643 at the beginning of the year. Many of these new birds are extremely interesting in appearance and in their ordinary habits of life, and to these characteristics are daily being added the courtships and the nest-building of a considerable number.



MALABAR SQUIRREL

THE SQUIRREL COLLECTION

WHEN the Small-Mammal House was opened, an interesting series of squirrels occupied the upper tier of cages on the west side of the building. A number of species have been added since that time, and the collection of these vivacious rodents is now very attractive, embracing species from the eastern and western portions of North America, as well as South America, and the Old World.

At the present time the collection of squirrels contains the following species:

North America.

Gray Squirrel.
Black Squirrel.
Fox Squirrel.
Red Squirrel.
Thirteen-lined Spermophile.
Western Chipmunk.
Eastern Chipmunk.

Exotic.

African Ground Squirrel.
Malabar Squirrel.
Prevost's Squirrel.
Mexican Red Squirrel.

Of this series the largest and finest species is the Malabar squirrel, largest of all the *Sciuridae* (*Sciurus malabaricus*), an animal inhabiting the southern portions of Malabar, the Wynaad, the slopes of the Nilgherries and Travancore. The body of this squirrel is as large as that of an adult prairie "dog." Above is a bright, chestnut brown. The sides and abdomen are yellow, and in vivid contrast to the rufous tints of the back.

Quite eclipsing the Malabar squirrel in brilliance of pattern is the Prevost's or tricolor squirrel (*Sciurus prevosti*), from the Malay peninsula. This species is lustrous black above, with a wide and vivid bar on each side of the body. In strong contrast to this arrangement is the under surface, which is bright cinnamon. The species is about the size of the North American gray squirrel.

Another attractive species of this series is the South American red squirrel represented by a pair of adult specimens. The color above is a striking, fiery red. This species possesses a fine, bushy tail, is very bold and active, and altogether a highly satisfactory animal for exhibition.

One of the exotic squirrels is exhibited under peculiar circumstances. This is the South African ground squirrel, a fine, large species that is longitudinally striped with dark brown, on a paler ground color. Our specimen was captured in Cape Colony when very young, and shortly afterward placed in

a cage containing two very young meerkats or suricates, which are not only carnivorous animals, but belong to a family whose members are notorious for their depredations among the smaller rodents and among snakes—in fact the Family *Viverridae*, containing the quarrelsome mongoose, to which the suricate is closely related. In the company with the two suricates, however, this ground squirrel grew and attained maturity, as was also the case with its flesh-eating associates. However, the three live in perfect harmony, rodent and carniv-



ALBINO GRAY SQUIRREL.

ores. At feeding time, the keeper introduces meat to the suricates and vegetables and nuts to the squirrel.

On one occasion this strange combination was broken up. The squirrel was placed in a separate cage, but, according to the animal-man's vernacular, all three of the animals were "thrown off their feed." The squirrel refused to eat, and the viverrines merely nosed over their meat and passed it by, searching every corner and squealing uneasily. On the following day the squirrel was again placed in the cage with its friends, and met a hearty reception, the suricates running about it in circles and finally licking it in cat-like fashion. All three animals at once began feeding with their usual appetites.

Among the North American squirrels on exhibition in the Zoological Park, the black squirrels (*Sciurus carolinensis*)—black phase—are specially attractive. In general conformation they are much like the gray squirrel (*Sciurus carolinensis*). Both of these animals are to occupy cages of the burrowing rodents' series during the summer months.

Perhaps the most interesting of all our squirrels is a very perfect and pure-white albino gray squirrel, from western Kansas, the gift of Mr. G. O. Shields,

editor of *Shields' Magazine*. For nearly three years "Inkey," as this beautiful creature is called, lived in the editorial sanctum of its donor, enjoying the freedom of the entire suite of offices, and its escape from death by accident was really remarkable. Once, indeed, it fell down a stair shaft and was much injured, but eventually recovered.

In outside enclosures will be quartered the large fox squirrel (*Sciurus ludovicianus*), and the common red squirrel (*Sciurus hudsonius*), a species common in the Zoological Park. Following the cages of the larger squirrels, in the series of burrowing rodents' enclosures, are the colonies of chipmunks, representing the western and eastern species and the dainty thirteen-lined spermophile (*Spermophilus tridecemlineatus*), a very showy species inhabiting the dry prairies of the Central and Western States.

R. L. D.

THE INLAND WHITE BEAR

ALTHOUGH we have not yet secured any living specimens of the new inland white bear (*Ursus kermodei*), collectors are on the lookout for them, and we hope to secure some ere long. Mr. Francis Kermode, Curator of the Victoria Museum, visited the habitat of the species last April, but was too early to find bears afoot. The Indians said they had not yet left their winter dens. Regarding the local reputation of the species Mr. Kermode writes as follows:

"These white bears are well known to the Indians and traders, and they all seem to agree that most of them are killed on Gribble Island, Princess Royal Island, and most of the other large islands in that coast district; also on the mainland side from Kiyimaat to Rivers Inlet; but they seem confident that most of them are killed on the islands. The reason of this is that the Indians when they hunt bear never leave their canoes until they see the bears come out on the bare patches in the mountains, and as there are no white goats on these islands (they being quite common on the mountains on the mainland), anything white attracts their eye.

"Mr. George Robinson, a store-keeper at Kitimaat and a trader, tells me that he has been there every year for about twenty years, but that the Indians get most of them on the islands. Mr. Clayton, from Bella Coola, tells me the same, and both these gentlemen have promised to endeavor to get the Indians to get me some good specimens. I called a short time ago to see Mr. Findlay, of Vancouver,

who is manager of a mine on Princess Royal Island. He has one of these white bear skins, and it was killed close to the mine. It is exactly the same throughout as the type specimen, but has not nearly such a fine coat, as it was killed in the month of June.

"Dr. Newcomb, of this city, who is out here for the Field Columbian Museum, Chicago, collecting Indian relics, has also made inquiries from the Indians and others along the coast, and also finds that the bear is well known to the Indians and traders along the coast. Rev. Mr. Collison, who was at Inverness Cannary this season, told Dr. Newcomb that he also has one of the white bear skins at his home. Mr. Ashdown Green, of the Indian Department, also says the Indians know this bear well."

W. T. H.

THE RUFF OR FIGHTING SNIPE

A QUARTET of the most interesting sandpipers in the world are now living happily and well in the new Bird House. They are known as ruffs, or in scientific parlance *Pavonella pugnax*, which being interpreted means, a little fighting peacock. Many of the snipe and sandpipers are known to do battle with one another for the possession of their little gray mates, but in no other species does the male gird on a shield for protection in these encounters.

During the winter these ruffs would attract no more attention than any large sandpiper; but at the approach of spring new feathers appear on certain parts of the head and neck and grow to a remarkable length, forming for the ears, and in fact for the entire body, a perfect feather shield. At the same time the feathers of the face fall out, leaving the skin bare, on the surface of which tiny, thickened warts form. Strangest of all, the pattern of this battle cloak is not the same in any two birds. If we could see fifty standing side by side, some would be seen to be pure white, others gray, black, orange, buff or chestnut; while the waving ear-plumes are also independent in color. They may vary from white to black, purple, green or blue. Then there is a type of barred ruffs, another with a pattern of spotted feathers, and so on in endless variation, this condition of affairs being wholly at variance with the generally uniform pattern of coloring of other wild creatures. We can compare these little Joseph-coated birds only with the endless variation of domestic poultry and pigeons.

But whatever the color, these ruffs or shields are evidently of great service to the bird in its encounters. The four individuals in the collection are all males, and their battle colors are a plain gray, dotted gray, a rich, golden rufous, and chestnut barred with black.

Though no females are present, yet the fighting instinct of the four ruffs often crops out, and a pair of them will dart and side-step about each other, bills held low and far advanced, ruffs spread out from the breast and trailing low, hiding almost the whole body. Now and then one of the fencers will make a vicious dash, sending his bill clear through the feather-shield of his opponent. But the force of his blow spends itself on the inch of space between the shield and the feathers of the bird's breast. Occasionally one bird will try to turn his adversary's guard by leaping suddenly over his head, but the other bird as quickly darts from beneath, and in an instant is on guard again. A spirited encounter is an exciting sight to behold, and all the more pleasing from the fact that with the exception of losing a feather or so, the birds never seem any the worse for their battle. If there were a lady in the case the results might be of more serious a nature.

These birds seem to realize the æsthetic value of their decorative ruff, and often indulge in a



RUFF OR FIGHTING SNIPE.

dance before a Reeve (as the female of this species is called), springing up into the air and turning round several times, ending by pointing the beak to the ground, spreading the ruff to its widest, and thus posing motionless for two or three minutes.

Very rarely after a severe gale, one or more of these sturdy birds are to be found on our coast,

but their regular haunts are in the Eastern Hemisphere. They breed in Northern Europe and Siberia, and in winter migrate southward to Africa, India, and China.

As in the case of other sandpipers, four eggs, spotted and blotched with brown, are laid on the ground, within a dense tuft of grass. To his shame be it said that after all his elaborate fencing and

dancing, the male takes no part in incubating the eggs or in caring for the young—*vivere sat vincere*.

In August and September the encounters between the rival birds grow less and less energetic, and in a few weeks the last frayed-out feather has fallen from the ruff. With it also disappears all pugnacity, and the birds live together most amicably until spring. C. W. B.



SULEIMAN MARKHOR.

Notes

Zoological Park

King Vultures.—A pair of young king vultures, not yet in full adult plumage, form a striking exhibit and with the California and South American condors, the black Turkey, and griffon vultures well represent this Suborder.

Cassowaries.—A rare Bennett cassowary and another unidentified species of the Ceram type are now in the Ostrich House, the yards of which are all filled; some, however, with birds which will eventually be settled in the Pheasants' Aviary.

Wading Birds.—The nucleus of a collection of the waders, especially the game birds of the world, has been formed—dowitchers, rails, ruffs, and lapwings being already represented. Covies of six or eight species of the smaller quail, as well as francolins, tinamous, and partridges share the in-door flying-cage of the new Bird House.

New Parrots.—Five Bahama Amazon parrots, the gift of Mr. Thomas Barbour, are valuable, as representing a species which has an extremely limited habitat and which will become extinct within a few years. Many other parrots have been added to the collections, including the rare Ganga cockatoos and tiny azure-backed parrotlets.

The Hawks.—The hawk collection is larger than ever before. Besides full-plumaged red-tailed and red-shouldered "chicken" hawks, there are Harris and Sennett white-tailed hawks from the West, marsh and sparrow hawks, osprey, gyrfalcon, kestrel, and no less than eight caracaras, whose ludicrous performances are as unhawk-like as they are amusing.

The Weaver Birds.—The weaver birds now occupy all of the northeast cages of the main hall, in the new Bird House. These dainty little birds are a great attraction—the brilliant hues of the Napoleons, bishops and pin-tailed nonpareils, the long trailing tails of the whydah-finch and the untiring nest-weaving-energies of the masked weavers providing unfailing interest for the visitors.

American Flamingoes.—The rearing of two young American flamingoes has been attended with complete success, and it is hoped that with the recent discovery of a diet which seems perfectly adapted to their needs, there will be no difficulty in ultimately rearing a good-sized flock of these birds, which from the standpoint of interest and exhibition are *sine quâ non* to a zoological park.

Skimmers and Terns.—A second flock of young black skimmers and common terns are being reared. These birds, so preëminently flyers, swing round and round their in-door cage, and their plumage proves them in perfect health. These are a few of the hundreds of birds which are being kept in health and happiness in the Zoological Park—the first attested by their appetites and plumage, the latter by their songs and nest-building.

Out-door Flying-Cage.—The birds in the out-door flying-cage are in perfect condition, and a dozen more American egrets have recently been added to their numbers, together with many herons and ducks. The snowy egrets and the white ibises nested close together this year and the latter hatched a young bird. When only a few days old it tumbled from the nest and landed uninjured on the ground. One of the parents without hesitation flew down, picked up the young bird and carried it back to the nest—a performance which in my experience is unique.

Aquatic Birds.—The duck collection now includes canvasbacks, the gift of Mr. Ernest Thompson Seton, and the rare New Zealand gray ducks. Bar-headed, spur-winged, and barnacle geese are recent arrivals and it is with special satisfaction, we announce, that with the arrival of a pair of Bewick swans the collection of these birds is complete, embracing all seven existing species—the trumpeter, whis-

tlar, whooper, mute, Bewick, black, and black-necked swans, all of which are now living on the ponds of the Zoological Park.

Doves and Pigeons.—The dove and pigeon collection is rapidly increasing in numbers and nesting has begun in several instances. There are Senegal and Chinese turtle doves, green-winged ground, mauvé, plumed, and white-winged doves, as well as many others. Bleeding-heart, band-tailed, and white-crowned pigeons are also on exhibition. The latter, with the Bahama ground doves and a cageful of honey creepers and grassquits, show us some of the more abundant birds of the Bahama Islands. Although these islands are so near our Florida coast, yet their native birds seldom fly across the sixty miles of intervening water. Yellow-headed blackbirds, from the Western States, make a brilliant spot of color in one of the side cages. Full of life they are and worthy of comparison with our red-wings.

European Birds.—Three large wall-cages have been thrown into one, making a flying-cage on a miniature scale, and here have been gathered a collection of the commoner birds of Europe. Bullfinches, chaffinches, robin redbreasts, blackbirds, thrushes, skylarks, nightingales, rosy finches, green- and goldfinches and black larks live here together contentedly; while next to them in two more flying-cages measuring five by fifteen feet, are the familiar birds of our own country—robins, thrushes, flickers, brown thrashers, catbirds, mockingbirds, Baltimore and orchard orioles, tanagers, grosbeaks, Texas cardinals, cowbirds, and others, a representative group of fine healthy birds. It is most interesting to listen to the warble of our robins and mockingbirds and then to hear the strains of the nightingales and skylarks.

C. W. B.



SQUIRREL FISH.

Aquarium

Attendance.—The attendance at the Aquarium during the first seven months of 1905 amounted to 971,911, an increase of 41,259 over the corresponding months of 1904.

Exchanges.—During the spring and summer two collec-

tions of fishes from the Great Lakes were received from the Detroit Aquarium in exchange for local salt-water fishes. The species received were: Muskallunge, pike-perch, pike, sunfish (two species), burbot, channel catfish, and mud-puppy.

Bermuda Fishes.—The collection of tropical fishes has received the usual summer addition from Bermuda, and there is now a fine series of these brilliantly colored fishes in the Aquarium. Annual additions to this collection have always been necessary as some of the delicate species do not survive through the winter. When the new salt-water system for the Aquarium, still under construction, becomes ready for use, the loss of tropical fishes in winter can be avoided.

Black-spotted Trout. The Aquarium has just received, through the United States Fisheries Bureau, 50,000 eggs of the black-spotted trout (*Salmo mykiss lewisi*) from the Yellowstone region. These eggs are now hatching rapidly and the fish will be ready for distribution some time in the fall. This is the first season that the Aquarium hatchery has been operated in midsummer, as the species handled heretofore have been such as deposited spawn in the winter and spring months. The black-spotted trout inhabiting the very cold waters of the Rocky Mountain region is a late spawner. The young fish now beginning to hatch are rapidly filling all the hatching troughs.

Large Aquatic Animals.—Among the larger aquatic animals recently received at the Aquarium may be mentioned the harp seal (*Phoca groenlandica*), four harbor seals from Maine, and a 313-pound green turtle. A dolphin was received on August 4th, but lived only four days, having been injured in capturing. It was taken in a pound-net at Long Branch and shipped to Fulton Market, where, unfortunately, it lay for many hours without attention. The specimen was seven feet long and proved a wonderful attraction as it went swinging about the large central pool, rising at intervals to blow in true whale and porpoise fashion. The large sturgeons secured over a year ago have been removed to the central pool, where they are doing well.

Fish Hatchery.—The Aquarium fish hatchery has been in constant operation since the first of the year; over two million food-fishes having already been hatched and turned over to the New York Fish Commission for distribution in State waters. The species hatched were brook trout, lake trout, rainbow trout, steelhead trout, landlocked salmon, white fish, pike perch, and yellow perch. As usual the eggs were generously furnished from Government fish hatcheries in different parts of the country. Several hundred white fish fry were retained at the Aquarium for further experiments in rearing, as this is one of our most difficult food-fishes to raise in captivity. The young fish are now being fed very successfully on the larvae of the mosquito. This food is obtained in abundance by the Aquarium collector from various stagnant ponds and pools in the vicinity of Gravesend Bay, being taken with a gauze dip net. It may now be announced to fish culturists that mosquito larvae is a very satisfactory food for white fish during the summer months. Early in the season, immediately after the absorption of the yolk sac, they feed on herring roe.

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"AS OTHERS SEE US."

[Editorial article in the Brooklyn Standard-Union, July 14.]

THE NEW YORK ZOOLOGICAL PARK

The completion of the Manhattan subway from the Battery to West Farms, within two short blocks of the Zoological Park, adds interest to the annual report of the New York Zoological Society, administrator of the finances and operations of the park. As a rather interesting coincidence, too, the opening of the Bronx and Battery extensions of the subway brings into close physical touch the two hitherto distant "plants" of the Society, that of the land in the Bronx and that of the water in the Aquarium at the Battery, so that by a transfer from one to the other in forty minutes both may be visited and thoroughly inspected during a single afternoon.

The ninth report, like those which have preceded

it, is a handsome volume of more than two hundred and fifty pages, finer in the quality of its material and workmanship than any other public document, the excellence of its illustrations being particularly noticeable. A carefully detailed statement of all the transactions of the Society, financial, physical and scientific, is presented, together with valuable monographs by Directors Hornaday of the park and Townsend of the Aquarium; Secretary Grant of the Society, and Curators Ditmars of reptiles and Beebe of birds of the park, while Messrs. Brooks and Blair of the medical staff discuss cage paralysis in primates, one of the most serious obstacles to the maintenance of large animals in captivity.

The report shows a healthy condition and normal growth in all departments, a great increase in public patronage, which is certain to be again enlarged by the improved transportation facilities and positive results already attained, which entitle the park and its collections to rank among the very best in the world. The wisdom of the allotment of that portion of the Bronx Park to the illustration of the life and habits of captive animals is every year becoming more apparent, and one of the very best proofs is the steadily decreasing mortality among the collections; increase in health and vigor, and improvement in conditions, which prove the merit of the environment and the administration, and commend the work as one of the most valuable of the higher educational facilities of the city. The taxpayers, who share in the support as well as the direct contributors, may abundantly satisfy themselves from the report, or by personal inspection, of the wisdom with which their money is expended, and that scientific ability and progressive spirit go hand-in-hand in obtaining for the people of New York the best in comparative zoology.

The Society is already known in the markets of the world as an exact and appreciative purchaser, ready at all times to get the best, but insistent upon full and real value for its money, as recent acquisitions, not yet publicly announced, will prove.

AGAIN THE AUTOMATIC GUN

In spite of many protests, the Winchester Arms Company has put on the market the deadly automatic gun previously noticed in the BULLETIN.

There is no excuse for those who make, sell, or

use this weapon. It belongs in the same class as the outlawed "punt-gun" for waterfowl, and the dynamite cartridge for fish. The "pump-gun" of to-day is certainly bad enough; and between it and the automatic machine-gun the line must resolutely be drawn. The sole reason for the existence of the new gun is that it is more deadly than any other on the market. If that is not the reason, then why is it made?

It is now time for every man who shoots with a shot-gun to decide where he will stand. Will he take a place beside the market-shooter and poacher, who despises all game laws and hates all game wardens, and slaughters all that he dares, in season and out; occasionally including the game wardens; as it recently occurred in Florida where an authorized agent of the Audubon Societies was deliberately murdered? Or will he stand with the conscientious sportsman, who believes in giving the wild creatures a fair show for continued existence?

The New York Zoological Society is unalterably opposed to the manufacture, sale, and use of the machine-gun. The war against the new exterminator of birds is now on, and it will be necessary for every self-respecting sportsman to do all that lies in his power to limit its sale and use.

THE DOG NUISANCE

During the spring of the present year, the street which forms the southern boundary of our exhibition grounds (182d Street) was graded and regulated. Throughout about two-thirds of its length, and close against our boundary fence, was erected a wall of loose stones to a height of from three to ten feet. In places our fence was practically destroyed and for a month our grounds were inadequately protected.

On July 24th the improvement of 182d Street was accepted by the city, and our force immediately began the erection of a very substantial wire fence, on steel posts, set upon the boundary wall of "dry rubble" masonry. The work was pushed with all possible vigor, and completed on August 10th—just fifteen working days. It could not have been erected earlier or more rapidly than it was.

On July 31st a mania for deer-killing broke out among the dogs that swarm around the Zoological Park. On the nights of July 31st and August 1st two successful attacks were made. Three axis deer does and two hog deer were killed.

A special night guard of two men was put on duty. On August 2d a prong-horned antelope and an Indian black-buck female were so frightened by dogs outside their corrals that they injured themselves so seriously it was necessary to chloroform them. After that six extra men were put on patrol duty at night, until our fences could be finished, and no further fatalities occurred.

Until the outbreak described above, the waters of Lake Agassiz had served as a barrier against the invasions of dogs from the north. But simultaneous with the attacks of dogs from West Farms those of Bronx and Fordham began a series of attacks. It was immediately apparent that nothing short of a dog-proof fence around the area north of Lake Agassiz could possibly prevent incessant attacks upon our hoofed animals. A large force of men was at once detailed to erect the fence required, and it was completed in September.

If there are any complaints from the public regarding the fencing of the area north of Lake Agassiz, our reply will be that the swarms of vicious, unlicensed, unmuzzled dogs running at large in Bronx Borough in complete defiance of the laws of this city have left us no alternative.

The outbreak of the "sheep-killing-dog" propensity in the Zoological Park was wholly unexpected, particularly determined, and vicious beyond precedent.

The wire fences surrounding our grounds and our deer ranges, and our exit turnstiles, are now as nearly dog-proof as it is possible for them to be made. Eventually we must be protected by stone walls and wrought iron. Meanwhile we are endeavoring to see what can be accomplished in the enforcement of the laws which prohibit unmuzzled dogs to run at large in this city.

The Society for the Prevention of Cruelty to Animals has been called upon to perform its duty to the city and to take action to abate the dog nuisance in northern New York City. W. T. H.

On September 2d, the Society received by cable the news that a Gorilla was to be had in Europe, and a deal was instantly closed by which this most interesting of all the great Apes was consigned via steamship *Graaf Waldersee* to the New York Zoological Society. Up to this time but one specimen has ever been exhibited in this country and it lived but five days. The Society's specimen was obtained through Dr. Cecil French and will arrive in New York the latter part of September.

LATER: At the moment of going to press, the editor regrets to announce that the Gorilla died aboard ship, en route.



GREAT ANT-EATER.

SOME VERY ODD MAMMALS

FROM an educational standpoint, the Small-Mammal House is one of the most important installations in the Zoological Park. In this building are grouped representative species of a greater number of the orders of mammals than are to be in any other building. At the present time, this collection contains species representing six different orders—the *Ferae* or *Carnivora*, *Glires* or *Rodentia*, *Ungulata*, *Marsupialia*, *Edentata*, and *Monotremata*.

It is among the lower orders of animals that we find the species that are most interesting for a small-mammal house. With the *Marsupials* is included the group of kangaroos, which, when the development of the front and hind limbs is compared, appear like two-legged creatures. The order of *Edentates* comprises the practically toothless species, some of which have slender tongues of nearly half the length of the body, which are employed in dragging ants from their burrows. The lowest order of mammals—the *Monotremata*—is

possibly the most remarkable, for the three species composing it lay eggs, and hatch them like birds. Anatomically, however, these creatures actually appear to be more closely allied to the reptiles than to the class which succeeds the mammals in regular order—the birds. Two vigorous examples of this interesting order are on exhibition in the Small-Mammal House. The collection of *Edentates* is also strong in species. As these creatures are among the most peculiar of the inmates of the Small-Mammal House, their habits, as we have observed them, are well worthy of note.

The great ant-eater or ant-"bear" (*Myrmecophaga jubata*) is the most interesting species of the *Edentata*. The specimen at the Park, although but two-thirds grown, is in perfect pelage and is a very showy creature.

Like many of those forms of animal life that evolution has manipulated into grotesque form, this is a delicate species in captivity. With all delicate animals the change from a wild state to



NINE-BANDED ARMADILLO.

captivity is like the seizure of a human being with an acute malady. There is a crisis, or turning-point, when the constitution rallies from the shock and enervation, or life ebbs away. Many freshly captured animals that are known to the animal-man as "poor feeders" undergo just such a condition. The creature is stupefied by the change of life, its energies are suspended, and it has no desire for food, nor the power to digest it.

It was in such a condition as this that our ant-eater arrived. Everything was done to stimulate its dormant energies. The first of these measures was a bath in tepid water, when it was placed in a warm, dry cage and several hours later offered food in the shape of a beaten raw egg. This it partially consumed, and retiring to the darkest corner of the cage curled itself up to sleep. Its persistence in hiding and sleeping was not to our liking. Continued sluggishness on the part of any animal either indicates or brings about indisposition and loss of appetite.

To liven up the specimen, it was taken out and turned loose in a grove near the Primates' House, where the ground was honeycombed in small areas by the runways of black ants. The move was a

happy one, for the animal immediately assumed such a spirit of vivacity that it appeared as if hypodermically injected with some powerful excitant. It at once employed its long, front claws to root into the ant burrows, starting a swarm of the angry creatures to the surface. When the ant-eater's snout was pressed tightly against the mouth of a burrow, the movements of the throat muscles demonstrated that the long tongue was in vigorous action. This attitude was continued until the mouth appeared to be full of ants, when there was a crude attempt at mastication, and the

scrapping of a few fiercely biting insects from the snout with the feet. After half a dozen such mouthfuls the animal seemed satisfied, and wandered about in casual fashion, returning for more ants after an hour or so.

The ant-eater weathered the crisis of a newly arrived animal, and is now in flourishing condition. It has been on exhibition for five months' time. In the morning it eats a mixture of eggs beaten in milk and mixed with scraped meat, after which it is placed in an out-door cage, and remains there during the day, on bare earth, searching for ants. At night it is brought in again, and given another meal



EIGHT-BANDED ARMADILLO.



THE ECHIDNA OR SPINY ANT-EATER.

animals inhabit Australia and New Guinea. To the popular eye their structure is bewildering. They are small animals—about twice the size of the European hedgehog. They possess short but very thick spines, a long tongue like an ant-eater, feet like a tortoise, and a long, slender snout quite unlike that of any other animal save the great ant-eater. Generally speaking, they are ant-eaters, and in a wild state live in burrows, in which the female lays one or two eggs, which are hatched in the same fashion as those of a bird.

of eggs, milk, and scraped meat. This animal is perfectly docile, and is carried about by his keeper like a very lazy pug-dog.

Another interesting Edentate exhibited in the Small-Mammal House is the prehensile-tailed ant-eater, or tamandua (*Tamandua tetradactyla*). This is an arboreal species, and possesses a round, hairless and prehensile tail in place of the blanket-like appendage of the former species. The two species were placed in the same cage, but engaged in what resembled a sparring match. Owing to the dangerous character of their very long front claws it was thought best to separate them. The food of the tamandua is precisely like that of the larger species.

Among our representatives of the *Edentata* are two species of armadillos. These are hardy and hungry little animals protected by a hard, bony covering laid over the entire upper surface in armor-like formation, and divided on the back into a greater or lesser number (according to the species) of hinges or "bands." This hinge-like formation permits the creature to roll itself into a ball in time of danger, completely protecting the soft portions of its under surface. Armadillos have voracious appetites. Captive specimens thrive best on boiled meat and various kinds of vegetables, and the mixture so craved by most of the captive Edentates—milk and eggs mixed with chopped meat. Of these reptile-like creatures the nine-banded armadillo (*Tatu novemcinctum*) and an eight-banded species, from Argentina, are on exhibition at the present time.

Of all the animals in the Small-Mammal House, the echidnas are the most interesting. These

Our echidnas are restless little fellows, with an amazing degree of strength, and if among the rock-work of their cage are dislodged with the greatest difficulty. The food of these animals is exactly like that of the ant-eaters. They feed readily and appear to be fairly hardy.

R. L. D.



THE ECHIDNA.

Showing the curious structure of the feet and under side.



CRESTED SCREAMERS.

These two fine specimens are quartered in the new Bird House.

CRESTED SCREAMERS

TWO closely related species of crested screamers inhabit, one the northern, and the other the southern portion of South America. They are birds of the open, level pampas or prairies, rather than of wooded or mountainous regions, and for several reasons they are remarkably interesting. Like a number of other Neotropical species they hold an extremely isolated position, their nearest of kin now living being the geese. Though screamers have large goose-like bodies and a waddling gait, their feet are not webbed, and taking all their characters into consideration we may aptly term them geese which have been specialized for a terrestrial and aerial life. When occasion calls for it they can swim readily enough, though not rapidly, and in their breeding habits they exhibit traits hinting of more aquatic ancestors. The nest is placed among reeds and water-lilies and sometimes even floats intact upon the surface of the water.

During the early settlement of the country the birds were unmolested by the Spaniards and Portuguese; but now that emigrants from other European countries are rapidly increasing in numbers, these great birds are doomed to an early extinction. Though their wings are armed with four long, sharp spurs, yet they are very gentle in disposition and even when flocks of hundreds are gathered together, they seldom show any animosity toward one another. This is to be explained by the fact that sociable though they are, they pair for life and until one of the pair dies they remain together year after year.

Their antithetical characteristics of gentleness and ability to deal telling blows with their armored wings is taken advantage of by the natives. The bird is caught and readily tamed and assumes charge of the poultry, feeding and living amicably with them and yet putting to rout all hawks and other enemies which threaten fowls.

Two remarkable traits which would never be suspected in this goose-like bird are a magnificent power of flight and a complicated song. We are told by Hudson, that being a heavy bird, it rises laboriously like a swan and with a loud beating of wings. "Nevertheless, it loves soaring, and will rise in an immense spiral until it wholly disappears from sight in the zenith, even in the brightest weather; and considering its great bulk and dark color, the height it ultimately attains must be very great. On sunny, windless days, especially in winter and spring, they often spend hours at a time in these sublime aerial exercises, slowly floating round and round in vast circles and singing at intervals. How so heavy and comparatively short-winged a bird can sustain itself for such long periods in the thin upper air to which it rises has not yet been explained." Its large feet and legs have a peculiar swollen appearance, which is due to a subdermal layer of air-cells continued over all the surface of the body. Possibly these somewhat aid the remarkable power of flight.

No less strange is the loud voice from which the

bird takes its expressive name. "When disturbed, or when the nest is approached, both birds utter at intervals a loud alarm-cry, resembling in sound the anger-cry of the peacock, but twice as loud. At other times its voice is exercised in a kind of singing performance, in which male and female join, and which produces the effect of harmony. The male begins, the female takes up her part, and then with marvellous strength and spirit they pour forth a torrent of strangely contrasted sounds—some bassoon-like in their depth and volume, some like drum-beats, and others long, clear, and ringing. It is the loudest animal sound of the pampas, and its jubilant martial character strongly affects the mind in that silent, melancholy wilderness.

"The screamers sing the year round, at all hours, both on the ground and when soaring; when in pairs the two birds invariably sing together, and when in flocks they sing in concert. At night they are heard about nine o'clock in the evening, and again just before dawn. It is not unusual, however, to hear them singing at other hours." C. W. B.

Recent Arrivals

Mammals.—Gifts and Purchases.—1 African Round-eared Elephant; 2 Macaque Monkeys; 1 Marmoset; 1 Gray Squirrel; 1 European Squirrel; 1 Flying Squirrel; 7 Angora Guinea-pigs; 1 South American Tapir; 1 Persian Wild Ass; 3 Black Apes; 3 Bonnet Monkeys; 5 Pig-tailed Monkeys; 2 Civet Cats; 2 Azara's Wild Dogs; 2 Black-footed Ferrets; 1 Bridled Ferret; 2 Minks; 1 Canada Lynx; 1 Crab-eating Raccoon; 4 Skunks; 1 Sun Bear; 1 Binturong; 2 Guanacos; 1 South American Swamp Deer; pair of Eld's Deer, or Thameng; 13 Sea Lions; 1 Malabar Squirrel; 2 Capybaras; 8 Kangaroo Rats; 4 Hutias; 1 Golden Agouti; 1 Viscacha; 4 Egyptian Jerboas; 3 Canada Porcupines; 3 Eight-banded Armadillos; 4 Nine-banded Armadillos; 1 Great Ant-eater; 1 Prehensile-tailed Ant-eater; 2 Vulpine Phalangers; 3 Wallabys; 2 Echidnas.

Reptiles.—Gifts and Purchases.—45 Painted Turtles; 8 Muhlenberg's Turtles; 2 Wood Turtles; 17 Musk Turtles; 1 Spotted Turtle; 4 Snapping Turtles; 8 Box Turtles; 2 Pine Snakes; 6 Water Snakes; 1 Black Snake; 6 Garter Snakes; 100 Spotted Turtles; 1 Tree Boa; 1 Sicilian Tortoise; 1 Albino Wood Turtle; 2 Alligators; 1 large Alligator Skull; 2 Horned Toads; 1 Swift (with two tails); 7 Iguanas; 2 Florida Chameleons; 1 Green Snake; 1 Texas Hog-nosed Snake; 1 Pacific Rattlesnake; 1 Western Diamond-backed Rattlesnake; 1 Boyle's King Snake; 3 Timber Rattlesnakes; 1 Spotted Salamander; 1 Opake Salamander; Collection of Newts; 1 Gila Desert Tortoise; 34 Horned "Toads"; 1 Chuckawalla; 1 Gila Monster; 8 Collared Lizards; 6 South American Iguanas; 1 Rough-eyed Caiman; 15 Banded Rattlesnakes; 1 Desert Rattlesnake; 1 Common

Boa; 1 Bahama Boa; 12 Fox Snakes; 25 Banded Water Snakes; 9 Pilot Water Snakes; 8 Red-bellied Water Snakes; 3 Hog-nosed Snakes; 1 Blue Racer; 3 Sirens; 4 Mud Puppies; 4 Axalotls.

Mammals.—Births.—1 Green Monkey; 1 Black Lemur; 2 MongOOSE Lemurs; 4 Lions; 1 Tiger; 15 Timber Wolves; 5 Mearns' Coyotes; 5 Prairie Coyotes; 8 Black Coyotes; 5 Buffaloes; 1 Elk; 2 Fallow Deer; 2 Barasinga Deer; 2 Axis Deer; 1 Nylghai; 2 Sika Deer; 1 Malay Sambar Deer; 1 Altai Wapiti; 1 Grant's Zebra; 5 Franklin's Spermo-philus; 6 Coypu Rats; 40 Prairie Dogs; 1 Russian Bear; 1 Raccoon.

Reptiles.—Births.—About 400 Garter Snakes; about 40 Banded or Timber Rattlesnakes; 5 broods of Water Snakes.

The returning "Ziegler Relief Expedition" has presented to the Park three Polar Bears, two Esquimaux Dogs, an Arctic Fox and eight Ivory Sea-Gulls. The Gulls are rare, and have never been exhibited in this country. The collection left London via steamship *Minnetonka*, arriving at New York, September 12th, and were quartered in the Zoological Park.

As the present issue of the BULLETIN goes to press the new Pheasants' Aviary nears completion, and will shortly be opened to the public view.

A great number of new birds have already been purchased, including Himalayan Monoul, Manchurian Eared, Peacock Pheasant, Vulturine Guinea-Fowl, Soemmerings Pheasants, Elliot Pheasant, Siamese Firebacks, Lineated Pheasant, Anderson Kaleege, Melanotus Kaleege, Satyra Tragopan, and a number of other rare varieties, comprising twenty-two species.



THE CAPYBARAS.

THE CAPYBARAS

OF all living rodents, the capybara is the queerest, and the most unlike a gnawing animal. It is as large as a half-grown hog; it is shaped and clad like a hog, and its food habits also are very swinish. Instead of being properly clothed with hair, it is covered with a thatch of coarse, gray bristles that grow in "blocks of five" an eighth of an inch apart. There is no tail, but if there is as much in evolution as some people claim for it, life in the fly-belt of the North should presently develop one.

The capybara is the largest of all living rodents. In weight it is about twice the size of a beaver. Its home is the reedy banks of the sluggish tropical rivers of South America, where they flow through the level forests near the coast. The delta of the Orinoco is well stocked with this species, and its flesh is a most welcome addition to the scanty bill of fare of the few Venezuelans who dwell in that region. About ten miles below Sacupana they were (in 1876) very numerous. Two or three small, wiry dogs are put ashore to run along the

bank and drive the animals into the water, to which they always flee for refuge. The capybara dives well, and at first can swim under water fully two hundred feet. The capybara hunter chases the animal in a canoe, and whenever it rises to breathe immediately forces it to dive again. Presently the animal becomes so exhausted it can dive no longer, and is finally speared and captured.

The capybara feeds wholly upon vegetable foods, and once fairly started is not at all difficult to keep in captivity. The swine-like appearance of the animal is also reflected in its temper and disposition. The two fine specimens in the Small-Mammal House are not only tame, but even affectionate, and fond of being petted. While seeking attention, or being handled, they utter a queer, clicking sound, indicative of good-will. Their outside cage is supplied with a tank of water in which they bathe frequently. The largest specimen is sixteen inches in height at the shoulders, twenty-eight inches in girth, twenty-nine inches long, from end of nose to where a tail might be, and weighs about seventy pounds.



FEEDING THE SEA-LIONS.

A week-day throng in the Zoological Park, watching the feeding of the sea-lions in the pool on Baird Court. The pool, recently completed, is 92 feet long, 57 feet wide and 8 feet in depth. It holds 150,000 gallons.



THE JAGUAR "SENOR LOPEZ."

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THE PHEASANT AVIARY AND ITS INMATES

THE completion and filling of the Pheasant Aviary in the New York Zoological Park, makes the sixth great installment of birds thrown open to the public,—the others being, in the order of their completion,—the Aquatic Birds' House, Ducks' Aviary, Flying Cage, Ostrich House and large Bird House.

The Pheasants' Aviary is a long building, corridor-like in structure, extending north and south, with twenty-two enclosures for birds opening into

runways measuring 8 x 24 feet, all facing the east. At each end of the building is a large room heated by a stove and affording room for thirty-two additional inside cages, all of which connect with outside wire-covered runways. This aviary is in a sense a double one, having a roomy dove-cote above each of the pheasant enclosures, for a collection of birds of aerial, perching habits, interfering in no way with the more terrestrial pheasants. The entire building and all the copings dividing the



THE PHEASANTS' AVIARY.

Located on the western side of the Aquatic Mammals' Pond.

runways are of cement, thus doing away with that greatest scourge of pheasant keeping—rats and other similar vermin.

The great Order of birds known as *Gallinæ*, comprises about four hundred species. It is in this group that we find the birds, which of all their Class are most useful to man—domestic poultry; and perhaps also the most gorgeously plumaged, as the Peacock and Impeyan Pheasants; while the common name of game-birds, given to the entire Order, shows that it is in a dietetic sense, and from the sportsman's standpoint, that mankind most often regard them.

In size these birds range from the Wild Turkey, which, with a maximum weight of twenty-five pounds or more, is one of the largest of the keel-breasted birds, to the tiny Chinese Painted Quail, less than five inches in total length. As comprising the principal minor groups of the Order may be mentioned the Mound-builders and Brush-turkeys, the Curassows and Guans, Partridges, Quail, Grouse, Turkeys, Pheasants and Peacocks.

In the collection of the Society there are at present nearly forty species of *Gallinæ*, many of which are quartered in the spacious runways of the Pheasants' Aviary.

The Subfamily *Phasianinæ* includes the pheasant-like game-birds. Passing over the Turkeys, Guinea-fowl and Jungle-fowl, the true Pheasants form an imposing array of proud carriage and splendid plumage. Many of these birds when captured, readily submit to a state of semi-domestication, laying fertile eggs and often rearing their young; yet it is a remarkable fact that a number of the most common species are natives of such isolated or inaccessible localities that but little, or nothing, is known of their habits in a state of nature.

Sharing the first large runway, at the northern end of the Aviary, and worthy of being classed with the Argus as among the most exquisite of Pheasants, are two pairs of Moonal Impeyan Pheasants. It is idle to attempt to describe these birds, and a photograph shows them to be apparently of only varying dark shades, with thick-set body and a racket-tipped crest. But when walking about in the full glare of the sunlight, the male Impeyan seems to be feathered with molten metal. From every plume a myriad tiny prisms dissolve the light into every hue of the rainbow. In a technical description of the species, we read such terms as

this,—metallic-green shot with purplish-blue, reddish copper-color, shading into golden-green and bronze-crimson, etc. The female, as is the case with many of the pheasants, is clad in sombre hues of black and buff.

Many of the pheasants and their allies are natives of India, and the wild fastnesses of the Himalaya Mountains are the centres of their distribution. Among the lower ranges the Jungle-fowl makes its home; midway to the greatest heights are found the Eared and the Blood Pheasants, while the Impeyans feed higher and higher, until, far beyond the limit of tree growth, they approach the zone of perpetual snow, perhaps sixteen thousand feet,—over three miles above the level of the sea! One observer says of these birds, "There are few sights more striking, where birds are concerned, than that of a grand old cock shooting out horizontally from the hillside just below one, glittering and flashing in the golden sunlight, a gigantic rainbow-tinted gem, and then dropping stone-like, with closed wings, into the abyss below."

It is seldom that a pair of these birds is seen together. There seems to be but little affection shown, and the female hatches the eggs and rears the young without any assistance on the part of the male. Four to six eggs are laid in a slight hollow in the ground. The call-note is a loud, plaintive whistle. Thousands of the skins of the male birds are annually imported into London to decorate, or rather to *deface*, the hats of women.

The Horned Tragopans are a splendid group of five species, of which three are represented in the collection. In color they are entirely unlike the Impeyans, the general tone being reddish and orange buff. The name (from the Greek, meaning the goat of Pan) is taken from the satyr-like, fleshy horns on the head. These birds are inhabitants of dense jungles and one must indeed be an enthusiastic sportsman to bring down a Tragopan. After tramping through water, filling one's clothing and flesh full of spear-grass and submitting to the blood-letting of myriads of jungle leeches, a long wait is necessary, during which the bird is drawn within gun-shot by imitating its cry. Then a momentary glimpse of its beautiful head and neck, is often all that is vouchsafed—so keen of sight and sense are they.

The Siamese Fire-backed Pheasant is not uncommon in collections, but absolutely nothing is



VIEW FROM THE ANTELOPE HOUSE.

Showing the Prairie Dogs' Village, Aquatic Mammals' Pond, and Pheasants' Aviary. This portion of the Park has been greatly improved during the past summer.



THE MANCHURIAN EARED PHEASANT.

A very large pheasant with sombre plumage.

known of its habits. Its home is in Siam and Cochin China, and natives bring specimens and skins into Bangkok.

High up among the wooded mountains of China and Thibet the great Manchurian Eared Pheasant makes its home. Unlike most of its allies it soon becomes tame in captivity, and, at the sudden intrusion of a keeper, instead of the only too frequent custom of whirring against the wires, this bird will often dispute the man's right to the runway.

The name Eared is an apt one; for the white ear coverts are long and brushed back of the head in a most characteristic way. Unlike the majority of pheasants the plumage is alike in both sexes. The Chinamen know the bird as *Hoke*, and for years have killed it in great numbers for food. This fact, together with the destruction of the forests which it inhabits, bids fair to result in its total extermination within a short time.

There is a genus of pheasants called *Gennaesus*, which contains some sixteen species, of which five are on exhibition in the new Aviary. These are the Black-backed, Anderson, Lineated, Swinhoe and Silver. The latter is the one most commonly

seen in captivity and it is also the most striking in color,—on the upper parts pure white, pencilled with the finest of black lines, while the crest and all the feathers beneath the body are merged into a monochrome of inky blackness.

This is another pheasant which is becoming very rare in a state of nature and as yet no one has discovered its feral habits of life. In the spring of the year the male Silver Pheasants have a habit of standing upright and vibrating the wings rapidly for fifteen or twenty seconds at a time, producing a loud, singing or whirring sound. The wings describe an arc of about seventy degrees, from a line parallel to that of the back, down almost to the feathers of the sides. It is interesting to compare this with the recently pictured drumming of the Ruffed Grouse ("Country Calendar," November, 1905). The males of this species are strong and pugnacious and will occasionally kill other pheasants which chance to be confined with them.

The bird which we know as the English, or Common, Pheasant, is found in a wild state only in Turkey and Greece and parts of the surrounding region, but it has been introduced into most countries in Europe. In England, however, pure



THE GOLDEN PHEASANT.

One of the varieties most commonly seen in collections.

English Pheasants are rare, most of the individuals being crossed with the Chinese Ring-necked species, and showing more or less traces of a necklace of white feathers. The male birds fight fiercely for the hens, but after the complement of eggs is deposited, the females are deserted by their mates and left to hatch and rear the chicks alone.

Both English and Ring-necked Pheasants have been introduced with success into various portions of the United States. On Gardiner's Island, at the extreme eastern end of Long Island, one may flush twenty or thirty pheasants from a single meadow; and when a hen bursts from the grass, careful search will often reveal six or eight tiny brown chicks crouching close to the ground.

There are about twenty species of true pheasants belonging to the genus *Phasianus*, all of which inhabit Asia. Several of these are on exhibition. The Versicolor, or Japanese Pheasant, and the Soemmering are different in color from the English, but all are built along the same lines, the males having a long, graceful tail. Most magnificent of all is the Reeves, clad in black, white and old gold, arranged in harmonious patterns. The tail sometimes reaches a length of five feet.

These birds are very difficult to hunt in the high mountain fastnesses in which they live, and even where they are reared artificially on game

preserves, their great power of running and their strong flight render them safe, except from an experienced sportsman. It is said they will sometimes travel thirty miles without a break,—a remarkable performance for game-birds, whose short rounded wings and heavy bodies usually preclude all long distance flights. When twenty or thirty of these great brilliant birds burst with a roar of wings from the undergrowth, the sight must indeed be a magnificent one.

The Golden and Lady Amherst Pheasants are alike in general contour of body, and both have conspicuous ruffs or capes, although their colors are very different. In the former the mantle is brilliant orange and steel blue, while in the Amherst bird the orange is replaced with white. These birds live in the mountains of western China and eastern Thibet, but almost nothing is known of their habits in a wild state. They breed readily in captivity, and are very common in collections of live birds.

The peacocks and the pheasants are to a certain extent connected by the Peacock Pheasants, a small group of small birds. Those in the collection are brownish in general color, with most of the feathers of the body, tail and wings tipped with metallic green eye-like spots. A peculiarity of this bird is the number of spurs on the legs,—two, three or

even four, and seldom the same number on each leg. When the young are hatched, they, like most pheasants, run about at once, and follow close behind their mother, finding ample protection under her long, arched tail. At her call they will run out, seize what bit of food she has found for them, and then hurry back to shelter. When the chicks are hatched under bantams, or other domestic fowls, this instinct is

often harmful, for so closely do they group themselves behind their foster mother, that they are in constant danger of being struck and killed by her feet as she scratches in the ground.

There are, in the collection, two interesting species of Grouse, possessing unusual interest. The far-famed Capercaillie is a splendid game-bird of the pine forests of Europe. The male is dark feathered, with a dignified mien, and when excited the feathers of the head and neck are expanded, making the bird look even larger than it is. A cock will sometimes weigh twelve pounds, but unlike most game-birds, its swift flight is almost noiseless.



THE LADY AMHERST PHEASANT.

In April the male selects some high pine and here he utters his "spel" or love-song. It consists of three notes, each repeated several times, and to such a pitch of excitement does he work himself, during the latter part of the utterance, that it often proves to be his undoing. His ecstasy is such that he apparently becomes blind and deaf, and, knowing this, the wily pot-hunter creeps quietly up just at this

moment and easily kills the performer. Many cocks may thus be traced and shot within a short time.

Another magnificent game-bird of the pine and birch forests of Europe, is the Black Cock, or Black Grouse. The males have a bare open space on the ground where, in turn, they strut with drooping wings and curious antics before the hens. All their strutting and fighting is forgotten when the hens begin sitting, the males then going unconcernedly off by themselves, leaving to their patient mates all the labor of incubation and rearing of the young.

C. W. B.

THE CALIFORNIA CONDOR

THREE species of vultures are found in the United States, the turkey, black, and California Vulture. The two former are well known, at least in the southern states, where we can seldom glance at the sky without seeing one or more black silhouettes against the clouds, as magnificent in their flight as they are repulsive in feeding habits. Recognized everywhere as valuable scavengers, they are protected by general sentiment as well as by law and if not actually increasing in numbers, are everywhere at least holding their own.

Not so the California Vulture, or Condor as it is also called (*Gymnogyps californianus*). Its doom is near; within a few years at most, the last indi-

vidual will have perished. Formerly of much wider range, it is now confined to a mere dot on the map near the Pacific in southwestern California, although a very few individuals still exist in the peninsula of Lower California. Here, among the wild mountain gorges of the Sierra Nevada, the pitiful remaining handful of these splendid birds, cling to life. On the wing, the California Condor is the largest and most graceful bird which inhabits our country. The bald eagle with wings spreading six or seven feet is dwarfed in comparison with this great bird, whose pinions span from nine and one-half to nearly eleven feet.

There are several causes for the rapid contracting

of the range of the California Condor. When the hot droughts of the summer dry up the fertile valleys, ranchmen are compelled to take their herds to the higher pastures, deep among the mountain ranges. Here they encounter grizzly bears and panthers in numbers, and havoc is wrought among the cattle and sheep. In return, the half-eaten carcasses are poisoned and many of these predatory mammals are slain.

But not a tithe compared to the number of innocent Condors, hundreds of which have perished while carrying out their habits of life in feeding upon the carrion left by the bears and cougars.

In Lower California where this cause has not depleted their numbers, another as equally fatal, has all but exterminated them. Gold seekers, both Indian and Mexican, lacking facilities to carry the gold dust, have found an excellent device in the great hollow quills of the flight feathers of the giant vulture. So valuable are these that an opportunity to kill one of these birds is never lost.

High up, in the recesses of some inaccessible cliff, a great greenish-white egg is laid and brooded, and here is hatched the ill-fated young Condor, clad at first in the whitest of down.

For four years the Zoological Society had endeavored to secure a specimen of this vanishing bird and at last succeeded by a lucky purchase of a young one which had been taken from the nest by a boy. It arrived at the Zoological Park on March 14, 1905, and has now moulted into the full adult plumage. This in general is blackish, with the lining of the wings white; this conspicuous color, showing only when the bird lifts its wings. The bare skin of the head is dull reddish. It is tame and even affectionate with the keepers and the



THE CALIFORNIA CONDOR.

bloom on its feathers, and its bright clear eyes show it to be in perfect health.

C. W. B.

As a result of the second day's drive of the herd of wild elk which for years have made their feeding grounds on the Miller & Lux ranch at Buttonwillow, thirty miles south of Bakersfield, Cal., twenty-three perfect specimens were captured with the lariat, and of these, twenty lived to be transferred to the Government reserve at Sequoia Park. At least 175 animals are still at large. The task of transferring the herd is to be abandoned for the present.—Chicago Post.

FEES FOR MEMBERSHIP.

The fees for membership in the New York Zoological Society are as follows:

Annual membership.....	\$ 10.00
Life membership.....	200.00
Patron's fee.....	1,000.00
Founder's fee.....	5,000.00
Benefactor's fee.....	25,000.00

Information and blank forms for membership may be obtained at the Service Building, at all entrances to the Zoological Park, and at the Secretary's Office, No. 11 Wall Street, New York City.

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Elwin R. Sanborn, Asst. Editor.

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FOUNDING A NEW BISON HERD.

A short time ago the Executive Committee of the New York Zoological Society decided that the measures thus far taken to insure the perpetual preservation of the American bison, as a species, are inadequate. It was pointed out that the captive herds in the hands of private individuals are continually being scattered through the deaths of their original owners. It is well recognized that the bison cannot be saved from extinction, even for one century, by breeding in the close confinement of zoological gardens and parks. Bison on exhibition have practically no exercise, and therefore cannot long perpetuate themselves to perfection.

The Zoological Society decided that it would inaugurate a movement by private individuals to establish herds on Government lands, which can

live absolutely in a state of semi-wildness, and develop well, through an infinite number of generations. In looking over the public domain, the Wichita Forest Reserve, in southwestern Oklahoma, near Fort Sill, seemed to offer the best opportunity for the development of a great semi-wild herd of bison. It was decided to offer the National Government, as a gift, a herd of from fifteen to twenty bison, to be delivered by the Zoological Society on the Wichita Reserve, provided the Government will first fence in a suitable range for the animals, to keep them from wandering, and also to protect them from molestation. It is believed that on that range, after one or two winters of partial feeding on hay, a herd will be able to live all the year round by grazing.

Without loss of time, a definite offer of eighteen bison, on the basis outlined above, was made to the Government through the Secretary of Agriculture. It met with a prompt and cordial response, and a request to cooperate with the Bureau of Forestry and the Biological Survey in the formulation of a definite plan for the fencing of a carefully selected area. In both the bureaus mentioned, the idea met with cordial favor, and prompt action.

The Society was invited to send an agent to Oklahoma without delay, to join a representative of the Forestry Bureau in selecting and recommending a location for the proposed range. On November 22d, Mr. J. Alden Loring left for the Wichita Reserve, as the Society's agent, to report in detail on all matters affecting the selection of a range, and enclosing it with a wire fence. His report is now in the hands of the Society, and the Department of Agriculture.

The Zoological Society proposes to take about seven bison from its herd of thirty-two head, and will purchase the remainder. The proposed nucleus herd will contain at least three different strains of blood, and it is believed that on the large range which the herd will have, the animals will increase so rapidly, and diverge so widely from the parent stock, that the dangers of inbreeding will be eliminated.

Congress will be asked to appropriate for the erection of the fence required a sum estimated at \$15,000. If this is granted promptly, the fence can be erected next summer, and the bison transferred and turned loose in the early autumn. There is good reason to hope that this proposal

will result in a new bison herd, under national ownership, which in a comparatively few years will number several hundred head.

THE STATUS OF BIRD LIFE.

In 1898 the Zoological Society published certain facts and figures relating to the general volume of bird life in the United States, and its increase or decrease during the previous fifteen years. The figures showing the decrease were rather startling.

Quite recently, Mr. E. H. Forbush has made for the Massachusetts State Board of Agriculture, a similar bird census, covering that state and the results have been published. It is of interest to compare his results with ours. Based on the reports of eleven observers, we estimated the decrease in the volume of bird life in Massachusetts at twenty-seven per cent. Out of 176 persons reporting to Mr. Forbush, seventy-one estimate the decrease in the state referred to at figures ranging from twenty-five to ninety per cent. and twenty others report "game birds decreasing, but song birds are increasing or holding their own." We are very well satisfied with our estimate of twenty-seven per cent. for the whole bird population.

Up to the time of the Zoological Society's investigation, the general warfare for the better protection of song birds had been by no means strenuous. But in 1899 and 1900, things took a decided turn for the better.

The League of American Sportsmen was founded. Audubon Societies were organized in many states, and the Audubon movement became a force of great and far-reaching power. The A. O. U., in 1900, appointed a Committee on Bird Protection. The passage of the Lacey Bird Law in 1900—chiefly through the efforts of the League of American Sportsmen and its President—gave power to the Biological Survey and to Dr. T. S. Palmer, which has resulted in enormous benefit to the whole cause of bird protection.

The work of all these forces is at last apparent. The good that the bird protectors have accomplished begins to be visible to the naked eye. Although the game birds still are steadily diminishing—thanks to the fact that about \$1,000,000 worth of low-priced shot guns are *annually* sold in this country—the song and insectivorous birds are faring better than they were in 1897. Eight years ago,

very few observers were able to report birds as either holding their own, or increasing. Now the difference in the bird ranks is perceptible, and the total is, in some localities, breeding up and slowly increasing. It is a great satisfaction to be able to make this statement.

The bird lovers can at last take courage. The fight is being won, by slow, but sure progress. But let no man or woman think of resting, or laying aside a weapon. The facts stated above are set forth in order to show that the struggle is not hopeless, and that the effort is worth while. Pretty soon, the makers of the deadly automatic gun will discover that the bird lovers "have not yet begun to fight!" The slaughter machine must be prohibited by law, even though the machinery to make it did cost \$50,000. And with it shall go the "pump gun," now in use, but far too deadly to stay.

W. T. H.

THE GIRAFFES.

Our pair of Giraffes arrived at the Zoological Park on November 9, 1903. Ever since that date, their health has been perfect, and they have furnished very little cause for anxiety. The male has never missed a meal, the female has missed only one or two. In their compartment in the Antelope House, which is 19 x 24 feet, during daylight hours, they are almost constantly on the move. In summer, their outdoor yard is utilized to the utmost, and the most astonishing sight in the Park is to see those ungainly creatures, vast of neck and leg, playfully gambolling up and down their corral. When the Hon. Edward M. Grout visited the Park last summer, the male Giraffe "showed off" by leaping fully three feet in the air, with all feet off the ground simultaneously.

The growth of these animals has been watched with much interest. Since their arrival, the female has gained one foot and eleven inches, and now stands exactly twelve feet high. The male has grown two feet ten inches, and now stands thirteen feet six inches. There are good reasons for our expectation that the male will attain a height of at least sixteen feet, with a possibility of seventeen feet.

GENERAL INFORMATION.

ADMISSION TO THE PARK.—On all holidays and on Sunday, Tuesday, Wednesday, Friday, and Saturday, admission to the Zoological Park is free.

On every Monday and Thursday, save when either of these days falls on a holiday, only members of the Society, and persons holding tickets from the Society, are admitted free. All others pay twenty-five cents for each adult, and fifteen cents for each child under twelve years of age. Tickets are sold only at the entrances.

Admission to the Aquarium is confined to members on Monday forenoons. It is open to the public from May 1 to October 31, 9 A. M. to 5 P. M., and from November 1 to April 30, 10 A. M. to 4 P. M. When a holiday occurs on Monday, the forenoon will be available to the public.

OPENING AND CLOSING.—From May 1st to November 1st the entrance-gates will be opened at 9 A. M. and closed half an hour before sunset. From November 1st to May 1st, the gates will open at 10 A. M.



AN INDIAN LEOPARD CUB.

THE SMALLER CATS

AMONG the smaller cat animals we find many species of brilliant coloration and interesting form. As the collection for the Small Mammal House was brought together, it became necessary to assemble a representative series of the small cats. However, few of these animals are to be found in the market, and purchases were at considerable periods apart. A constant search for the species most desired has at last produced a fine and representative series. Among those from the Eastern Hemisphere, are a fine pair of Clouded Leopards (*Felis nebulosa*), the Serval (*Felis serval*), and the Jungle Cat or Leopard Cat (*Felis bengalensis*). The most interesting among the New-World species are the Yaguarundi Cat (*Felis yaguarundi*), the Ocelot (*Felis pardalis*), the Canada Lynx (*Lynx canadensis*), the Bay Lynx (*Lynx rufus*), and the Texas or Spotted Lynx (*Lynx rufus maculatus*).

The most important of these animals are the two Clouded Leopards, which were purchased from Capt. Richard Craven, of the steamship *Indramayo*. Captain Craven procured the animals at Singapore.

They represent the darker of the two phases of this cat—the other being a very tawny, reddish phase. The Park specimens are distinctly olive, with dull black markings arranged in broad bands on the neck, and assuming a reticulate pattern on the body. The general effect is precisely like the coloration of the big Indian python (*Python molurus*). As the Clouded Leopard is essentially a tree animal, and the python is likewise (partially) arboreal, this “mimicry” is significant. Whether or not there is an intention in Nature’s plan for the pattern of the mammal to suggest that of the snake, is problematical. In such cases it is altogether unwise to resort to theory.

In proportion to the size of the animal, the dentition of the Clouded Leopard is remarkable. The canines are enormously developed, and taper to a long point. As the animal opens its mouth and rolls back its lips to snarl at an intruder, the vicious aspect of the long, glistening teeth is striking, and at once recalls the fossil skulls and restorations of the saber-toothed tiger.



THE OCELOT.

The climbing power of this species is surprising. It can walk at some speed along a horizontal bar not over an inch in diameter, or traverse the same bar with *body hanging*, sloth like, the latter operation being accomplished with the assistance of a sharp, inward contraction of the feet. On the ground it is not especially graceful, as it appears more like the cub of some large species than a mature animal. The feet are large, and in walking the gait is clumsy and waddling rather than lithe and stately like the tread of most cats.

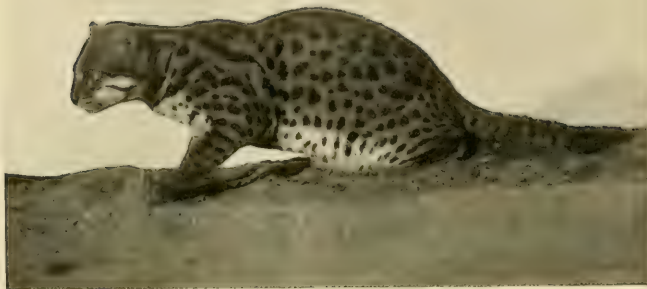
A large specimen of the Clouded Leopard measures from 36 to 40 inches in length of head and body, the tail about 30 inches in length. The species is alleged to attain a larger size. It inhabits India, from the southeastern Himalayas throughout Burma, and the Malay Peninsula, to Sumatra, Java, and Borneo.

A handsome specimen of the Jungle Cat or Leopard Cat (*Felis bengalensis*), has been in the Small Mammal House for some weeks. This is one of the large number of spotted cats found in southern Asia and the larger islands of the Malayan Archipelago. It is a graceful animal, not unlike a domestic cat in general appearance, though the tail is shorter. The ground-color is tawny, thickly sprinkled with solid brown blotches and the neck is banded. The beauty of this animal induced its former owner to try to tame it. He was unsuccessful. After experimenting for several months—even permitting the animal to wander from its cage—it remained as cross

and nervous as when he received it. This experiment has often been tried, and almost invariably with the same result. The beauty of the creature and its similarity in proportions to a house cat are



THE BAY LYNX OR WILD CAT.



THE LEOPARD CAT.

misleading characters. Mature individuals keep their corners, snarl and spit viciously—except at the sight of food, and the instant it is received the giver is greeted with a malignant, green-eyed stare and a guttural expostulation for daring to longer intrude his presence. Very young specimens may be tamed and remain docile and affectionate for a time, but the wild blood of the parent asserts itself with maturity, and the sight of food at once destroys all docility.

The Serval (*Felis serval*), is an important figure among the small cats of our collection. In structure it stands midway between the common leopard and the cheetah. To one who has observed the cheetah, the Serval is at once interesting. The first impression of the former species is a lasting one. Long-legged, built like a greyhound in the body but with a typical, rounded, cat-like head, this remarkable creature, in moving about its cage, produces a clattering on the wooden floor with its dog-like feet and claws; but a moment later may roll back its lips and hiss, in true, cat-like fashion. To the novice it is a nondescript. On several occasions the writer has heard careless visitors, who had not taken the trouble to look at the label, pronounce the cheetah a "dog-cat," and advance the theory that it was the result of freak breeding at the Park.

The relationship of the Serval to the cheetah is at once apparent by the structure of the long, thin limbs. The claws of the front feet are retractile and in strict accord with those of the average cat. The hind feet, however, are rather dog-like, and the claws are permanently exposed.

In the Park's collection, the North American cats are very well represented, even though the Margay Cat and the

last Canada Lynx died last summer. A fine pair of Pumas or "Mountain Lions" (*Felis concolor*), are exhibited outside of the Small Mammal House, together with one species and one sub-species of lynx. The Canada Lynx (*Lynx canadensis*), is a fine species and is usually represented in the Park collection. It is rather a larger and stouter animal than the Bay Lynx (*Lynx rufus*), and may be recognized by its proportionately much larger feet, and the well-developed tuft of hair, or "pencil," on the tip of the ear. The species is rapidly becoming scarce, and, unfortunately, is not a hardy species in captivity. The Bay Lynx or Wild Cat (*Lynx rufus*), is a hardy and continually irritable species. Several specimens are exhibited, together with the spotted phase—the Spotted Lynx or Texas Lynx (*Lynx rufus maculatus*).

Several months ago, the Society was fortunate in securing an exceptionally fine specimen of the southern Yaguarundi Cat (*Felis yaguarundi*). The specimen was captured near Brownsville, Texas. This animal represents a delicate species; but a careful study of its diet brought the creature through the fretful, worrying stage of the newly arrived specimen, and it is now thriving. Over its original size, on arrival, it has increased substantially, and has developed a beautiful coat of hair. Seen from a distance, this long-bodied

feline might readily be mistaken for an otter or a marten. Its habit of running or "galloping" about the cage, with its back sharply arched, is anything but cat-like. The Yaguarundi Cat inhabits southern Texas, Mexico, and Central America.

Experiments in the breeding of the smaller cat animals are now being conducted in the Small Mammal House. Two litters of Ocelots (*Felis pardalis*), have been successfully bred and reared in the building. More examples of all the species are needed to pursue this work, and the markets are constantly watched for good specimens.

The feeding of the small cat animals is more complex than the care of their larger allies, in the Lion House. If raw beef or horse meat were fed as constantly to the small species as to the lions, tigers, leopards and other inmates of the Lion House, an epidemic of fits would soon develop. The small cats do best on "dipped" meat—meat that has been quickly steamed or placed in boiling water for a few minutes. And this diet must be frequently varied with fowls, rabbits, and rats. From the latter, freshly killed, the cats obtain bone-food nourish-

ment. It is also important that they consume a certain amount of feathers or fur, as these substances produce a beneficial effect upon the intestines.

It is not from the collection of small cats alone that the Small Mammal House is of importance. The greater numbers of the Orders of the smaller mammalia are represented in that building. In passing through it the teacher and the class may acquire a bird's-eye view of at least six or seven Orders.

With the cats, and a rich collection of viverrines, there are small bears, foxes, squirrels of many kinds, tropical wild swine, ant-eaters, armadillos, and marsupials, living under one roof. The amount of food that goes to this building, and the varied nature of that food, may readily be imagined. It is only by the most painstaking care, and ceaseless industry and vigilance, that this difficult collection is kept clean and in good health; and Keepers Mercer and Cominsky are entitled to much credit for their successful work.

R. L. D.

GAME PROTECTION

ALTHOUGH song-birds are not legitimate game for a real sportsman, so long as misguided natives and ignorant aliens attempt to shoot robins, thrushes, and jay-birds for food, just so long may we properly classify our efforts in behalf of song-birds under the general head of "game protection."

During the past half year, Mr. G. O. Shields, the Society's Special Agent for Game Protection, has been active in several directions. All the Italian newspapers of New York were requested to announce the enactment of the new law against the carrying of firearms by unnaturalized aliens, and this request was very generally and courteously complied with. Mr. Shields sent out about three thousand cloth posters, both in Italian and English, stating the terms of the law, and warning all persons not to violate it.

In September and October, the birds of the northern portion of New York City were assaulted in force, every Sunday, by Italians who sought them for food. The police authorities paid no attention to the shooting that was done, until called upon for

officers to take charge of persons arrested by the men of the Zoological Society. Assisted by Messrs. Merkel, Bell, and Rose, of the Zoological Park force, Mr. Shields made several Sunday raids on the bird killers, from first to last caught about fifteen persons, and took them to court for punishment. On one man, *forty-three song-birds* were found, and the whole lot of innocents was preserved in formalin to do duty in court as Exhibit A. All these offenders have been held under bonds pending trial.

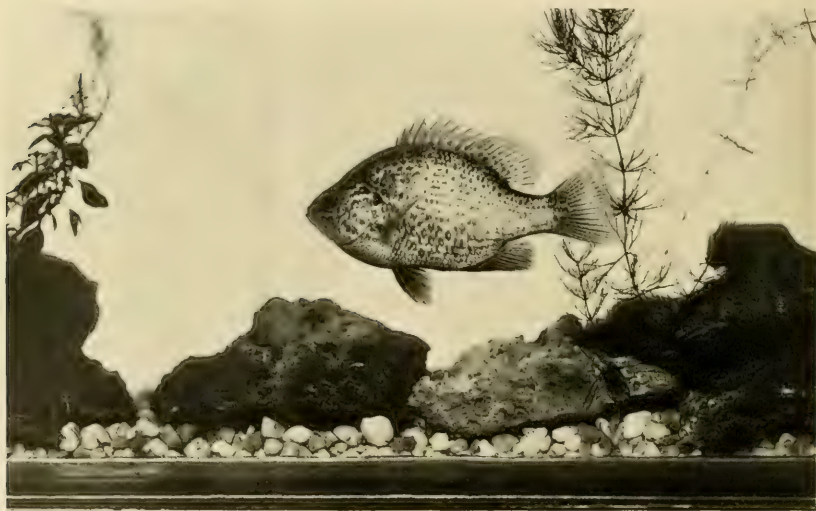
Two of the members of the Zoological Park force, Messrs. Rudolph Bell and John J. Rose, have been commissioned by State Game Commissioner Whipple as Deputy Game Wardens, and they will do much toward making bird-life secure in the Borough of the Bronx.

The automatic gun needs only to be mentioned to the press and to real sportsmen in order to hear it condemned. Thus far about seventy newspapers have denounced it. During the early days of December, resolutions condemning that weapon,

and calling for laws prohibiting its use in hunting, were adopted by the New York Association for the Protection of Fish and Game, The New York State League for the Protection of Forests, Fish and Game (composed of about forty local clubs), and by the Lewis and Clark Club, of Pittsburgh.

And out of all this chorus of condemnation, there have been heard only three voices in defense of

"the most murderous shot-gun ever invented." The real struggle will come in the State legislatures, where the protectors of wild life will meet a well-paid automatic-gun lobby, prepared to fight to the last gasp for the right to make a deadly machine for bird slaughter. The gun-lobby should be met by a nature-lovers' lobby, equally strong, and equally able to camp on the field and stay to the finish. Such a warfare requires war funds. W. T. H.



SUNFISH.

From a photograph made at the New York Aquarium.

MOSQUITO LARVÆ AS FOOD FOR WHITEFISH FRY

THE young whitefish, referred to in the last number of the *Bulletin* as having been fed on the larvæ of mosquitoes, have now reached the fingerling stage and make such a beautiful showing in the exhibition tanks, that a full account of their rearing will be interesting to fish culturists.

Whitefish are not easily raised in captivity, and the custom at government and state hatcheries has been to deposit them as soon as hatched.

The eggs were received, like nearly all the fish eggs used in maintaining the fish-hatching exhibit at the Aquarium, from the United States Fisheries

Bureau. Eight thousand eggs which were maintained in the hatching jars at an average temperature of 40 degrees, hatched out between March 10th and 16th. They were transferred to glass aquaria, and after the absorption of the yolk sac, were fed on herring roe for about a month, after which this food was mixed with finely pulverized liver.

On May 12th, seven thousand fry were delivered to the New York Fish Commission for planting in state waters. The loss up to this time was comparatively slight amounting to about four hundred and fifty fry. One thousand were retained at the

Aquarium. From this time until July 1st there was considerable loss, due apparently to the absence of minute live food.

About July 1st they were supplied with quantities of mosquito larvæ, but the fishes were scarcely large enough to devour them.

It was observed that a few of the larger individuals promptly seized the larvæ and soon succeeded in swallowing them. A week or two afterwards, most of them were feeding freely and as time passed very few dead fishes were to be found in the tanks. This food was continued until October 1st, with more or less herring roe and liver.

Refrigerated water was used, and the fishes were kept at the average temperature of 57 degrees. About the first of October they were feeding so freely on liver that the larvæ were discontinued.

There are now about two hundred specimens in one of the large exhibition tanks, in fine condition and growing rapidly, the largest averaging from two and one-half to five and one-half inches.

The rearing of the young whitefish was attempted in the Aquarium two years ago, and it was found that they fed very well on herring roe until late in May. No attempt was made at that time to procure live food, and the specimens dropped off until less than a dozen remained. Most of these were gone before the winter passed, three specimens only living until the following summer. One of these, a fine fish about twelve inches long, remains at the end of two years.

There can be no doubt that herring roe is a satisfactory food for whitefish fry for a couple of months after hatching, and that with mosquito larvæ a very large proportion can be carried through the summer in good condition.

The larvæ were obtained by means of a gauze dip net from pools and ponds in the vicinity of Gravesend Bay. From different locations different sized larvæ were procured, and it is quite possible that a search in other localities would have yielded a smaller species of larvæ which would have made it practicable to furnish the whitefish fry with smaller live food at an earlier date.

It is quite possible that larvæ could be made available for young whitefish at an earlier stage by crushing or cutting into finer morsels.

It has been the custom each year since the fish-hatching exhibit was started at the Aquarium to retain small quantities of fry of different species

for exhibition purposes. The fingerlings from this year's hatching consist of brook trout, lake trout, rainbow trout, steelhead trout, black spotted trout, and land-locked salmon. These were all fed, to some extent, during the fry stage, on mosquito larvæ and at no time since the hatchery was started has the Aquarium contained such thrifty specimens of the above-named species.

The placing of small quantities of rock salt in the hatching troughs two or three times a week has been found helpful in preventing fungus growths, not only on whitefish, but on trout and other fry.

C. H. T.

Notes

The most important additions since October 1st have been of American birds. These include many species which have never been successfully kept in captivity, such as barn swallows, water thrushes, vireos, shrikes, kingbirds, and cuckoos.

Five rough-legged hawks now in the collection are just coming into the adult plumage, showing the characteristic broad band of black across the lower breast.

The collection of Cuban birds has become important enough to warrant the giving up of three or four cages exclusively to them. Never have individuals of the Cuban orioles, rufous-shouldered blackbirds, solitaires, trogons, mocking thrushes (*Mimocichla*), sugar birds, banana-birds, grass-quits, bullfinches (*Melophyrra*), gallinules, bob-whites, and sparrow hawks been exhibited together. Almost all are peculiar to this island, which, lying so near our own coast, is of particular interest. Both light and dark phases of the sparrow hawks are represented. The solitaires are now (mid-December) just uttering the first notes of their wonderful song. The bob-whites, compared with our northern birds, are remarkably small and dark-colored.

A woodcock, a splendid northern raven from Alaska, and a gannet in immature plumage are other important additions.

A fine male South African ostrich has been added to the collection of Struthious birds.

With the remarkably varied collection in the flying cage of the new Bird House, a beautiful horned grebe in winter plumage has taken up its quarters—sole representative of the Order *Pygopodes* in the Zoological Park.



GIVING THE OSTRICHES A SHOWER-BATH.

During the excessively hot weather in July, the Struthious birds were daily sprayed with the hose. The passive attitudes of the ostriches shown in the photograph indicate how thoroughly they enjoyed this luxury.

The year just closed has given us an unusually fine and prolonged working season, and therefore the list of things accomplished is long and satisfactory. In order not to anticipate the annual report for the year, this notice will be very brief, and categorical. A few items will be mentioned, about in the order of their importance.

The new Bird House was completed and opened to the public.

The new Pheasants' Aviary was completed, stocked and opened.

Extensive border plantations were planted along the southern and western boundaries of the Park, and much planting done elsewhere.

A new Camel House was erected near the south-entrance.

The Sea-Lion Pool in Baird Court was completed and stocked.

The Tortoise Yards, at the east end of Reptile House, were made.

A new walk, of plank and macadam, was constructed from the Beaver Pond to the northeast entrance.

Two Public Comfort Buildings were erected in the eastern side of the Park.

A new Fallow Deer Range was constructed.

Lake Agassiz was excavated to an additional depth of three and one-half feet.

New fences were erected along the northern and southern boundaries of the Park.

Two new walks were laid out and constructed, from the West Farms entrance to the Antelope House and Buffalo House.

A new entrance, at West Farms, was begun, and one-third completed.

New granite steps were erected south of the Bear Dens.

New fences were erected around the old ranges for hoofed animals.

A contract (\$67,000) was let for the western and northern faces of Baird Court, and the work was one-fourth performed.

A contract was let for a Small-Deer House.

A contract was let for a large Public Comfort Building near West Farms.

A contract was let for electric cables and electric fixtures in five buildings.

A contract was let for a Boat House near West Farms.

A contract was let for an Entrance Pavilion at the new southeast entrance.

ZOOLOGICAL SOCIETY BULLETIN

No. 21

PUBLISHED BY THE NEW YORK ZOOLOGICAL SOCIETY

April, 1906

SOME BIG SEA TURTLES.

THE Aquarium has on exhibition two green turtles and two loggerheads of large size. The green turtles weigh 360 pounds and 313 pounds respectively, while the loggerheads each weigh 275 pounds. Larger examples than those in the Aquarium are not often seen, although both species have been known to exceed 1,000 pounds in weight.

The accompanying photograph, taken in the

Aquarium, gives a good idea of the size of the 313-pound specimen. One of the loggerheads has lived in the Aquarium six years. Both species are common along our South Atlantic and Gulf Coasts, and thrive admirably in captivity.

Other kinds of sea turtles to be seen in the building are the hawksbill and the Pacific green turtle. The latter has been in the Aquarium nine years. They increase in size slowly.



A GIANT GREEN TURTLE.

From a specimen in the Aquarium, weighing 313 pounds.



THE SOCIABLE DOLPHIN OF PELORUS SOUND, NEW ZEALAND.

A CELEBRATED DOLPHIN.

MR. L. F. AYSON, Inspector of Fisheries of New Zealand, who visited the Aquarium in January, presented the photograph published herewith, showing a dolphin dashing about the bow of a vessel, and made the following statement relating to it:

"This animal has for years frequented the entrance to Pelorus Sound, New Zealand, regularly meeting passing vessels and accompanying them for several miles on the course to and from French Pass. Its appearance is a regular feature of the trip from Cook Straits and Marlborough Sound to the town of Nelson.

"Mr. Ayson has long been acquainted with the habits of this dolphin, known to local sailors as 'Pelorus Jack,' and has many times observed it carefully. He says that the object of its persistent familiarity is plainly to scratch itself against the vessels. Its method is to dash across the bow, each time vigorously rubbing some part of its body.

"This is done repeatedly until all parts of its

back, sides, and belly have been scratched against the ship's bow.

"Usually joining the vessel astern, it goes rapidly forward, often bounding out of the water, until it begins its customary performance at the bow.

"This solitary dolphin, which is about twelve feet in length and has been identified as Risso's Dolphin (*Grampus griseus*), has inhabited the entrance to Pelorus Sound for nearly twenty years.

"It is an object of such interest to the public that government regulations as well as popular sentiment now protect it against pistol shots from misguided marksmen."

FEEES FOR MEMBERSHIP.

The fees for membership in the New York Zoological Society are as follows:

Annual membership.....	\$ 10.00
Life membership	200.00
Patron's fee.....	1,000.00
Founder's fee.....	5,000.00
Benefactor's fee.....	25,000.00

Information and blank forms for membership may be obtained at the Service Building, at all entrances to the Zoological Park, and at the Secretary's Office, No. 11 Wall Street, New York City.

ARE FISHES KILLED BY FREEZING?

THIS is a question which comes up occasionally in spite of the fact that it has often been answered in the negative.

Mr. W. E. Meehan, Commissioner of Fisheries of Pennsylvania, recently called at the Aquarium and gave the following account of his experiments in freezing and thawing live fishes. He has kindly allowed it to be published here in advance of the account included in his annual State report.

Six three-year-old trout were placed in a tub of water, six two-year-old trout in another tub of water and six yearlings in a bucket of water. All three vessels were placed out of doors in very cold weather and the water allowed to freeze solid.

The freezing in the last-named vessel was so thorough that the staves of the bucket were burst apart. The eighteen fishes were allowed to remain encased in ice for two weeks, when they were thawed out by allowing spring water to flow steadily on the ice. The thawing required about twenty-four hours.

Of the eighteen fishes the two- and three-year-olds were all dead and two of the yearlings—the latter bore evidences of having been dead only a short time.

The two- and three-year-olds had evidently died soon after being frozen in. The four yearling fishes which survived were none the worse for the experiment.

The experiments were made at the State hatcheries located at Wayne, Bellefont, and Corry, Penn.

Subsequently there was a natural freezing in a shallow artificial pond near one of the hatcheries which contained about 2,000 yearling California trout. Through some accident the water supply was cut off and the water in the pond froze solid and remained so for several days. The water was only about a foot deep. When the thaw came not one fish was found dead.

Mr. Meehan undertook these three experiments to refute statements in circulation that the cold winter had destroyed a large number of trout in the streams. As a matter of fact there was better trout fishing in Pennsylvania the following season (1905) than there had been for many years.

In the above prearranged freezings the tests were very severe. Under natural conditions it is not likely that fishes are often frozen in winter. Their tendency is to seek the deeper water of pools and channels as cold weather comes on, where they can keep below the ice. Fishes are not very active in winter, although they can be taken in fishing through the ice.

Even at the Aquarium where the water has flowed a long distance in underground pipes, protected from the winter cold, the fresh-water fishes go into

a semi-torpid condition, many of them lying quietly at the bottom of the tanks and refusing food for months. Fishes of the pike family eat little, although remaining poised in mid-tank. Trout and salmon continue active in winter, feeding freely.

In regard to the actual freezing of fishes, Mr. W. I. DeNyse, of the Aquarium staff, makes the following statement, based on his personal experience:

"Eels speared in winter through holes cut in the ice and thrown out on the ice soon freeze hard and stiff and may remain in that condition the rest of the day. When taken home and thawed in a warm room so that they can be skinned easily, they are always found to be alive and squirming except in the case of those badly mutilated by the spear or killed outright."

Members of the New York Zoological Society are entitled to the Annual Reports and Quarterly Bulletins and to free entrance on closed days to the Zoological Park and Aquarium. Dues for annual members, \$10. Life members, \$200. Information and application forms may be obtained at the Aquarium, at the office of the Society, 11 Wall Street, and the New York Zoological Park, New York City. Publications may be obtained at any of the above-mentioned places.

PUBLICATIONS.

First Annual Report.....	Paper, \$.75	Cloth, \$	1.00
Second.....	"	.40	"	.60
Third.....	"	.40	"	.60
Fourth.....	"	.75	"	1.00
Fifth.....	"	.75	"	1.00
Sixth.....	"	1.00	"	1.25
Seventh.....	"	1.00	"	1.25
Eighth.....	"	1.25	"	1.50
Ninth.....	"		"	
Notes on Mountain Sheep of North America. (Hornaday).....	Paper,			.40
Destruction of Our Birds and Mammals. (Hornaday).....	"			.15
The Caribou. (Grant).....				.40
" " " ".....	Cloth,			.60
The Origin and Relationship of the Large Mammals of North America. (Grant).....	"			1.00
The Rocky Mountain Goat (Grant).....	"			1.00
Sea-Shore Life. (Mayer).....	"			1.20
Guide Book: New York Zoological Park. (Hornaday).....	"			.25
Bulletins No. 5 to No. 20.....	\$.15, four numbers			.50
Bulletin No. 6.....	out of print			
Book of Views, 20 pages, 5 x 7 inches. 24 Illustrations.....				.75
Book of Views, 24 pages, 7 1/2 x 9 inches. 50 Illustrations.....				.50
Book of Views (New) 50 pages, 9 x 11 inches. 50 Illustrations.....				1.00
Postal Cards, Black and White.....	.5 for \$.10	13 for	.25
" " Bromide Black and White.....	"	1.10	"	.25
" " Colored.....	"	1.10	"	.25
" " New Color Process.....	"	.10	8 "	.25
" " (Aquarium).....	In sets same as above			



LARGE-MOUTHED BLACK BASS.

DO FISHES SLEEP?

MANY years ago, while at the Government biological laboratory as Woods Hole, Mass., Professor Verrill, of Yale University, made some observations of the nocturnal habits of fishes and came to the conclusion that they often sleep.

He examined the aquaria after midnight, with the gas turned very low. He found that the fishes took unusual positions and were quickly awakened by the turning up of the light. Their colors when asleep were darker and different from their daytime colors. When awakened they took on at once a brighter coloration.

It is possible that fishes sleep in the daytime also. It is no uncommon thing in the New York Aquarium to see the file-fishes (*Monacanthus hispidus*), black-fish (*Tautoga onitis*), tautog (*Tautoglabrus adspersus*), hinds (*Epinephelus guttatus*), and groupers (*Epinephelus morio*), lying quietly in a corner. Sometimes the hinds assume a vertical position in the rockwork. The trigger-fishes (*Balistes carolinensis*) often lean against the walls or lie flat on one side. Their colors at such times vary from those exhibited when active.

In these positions, which may be maintained for hours, the fishes are supported by the rocks so that fin movements are unnecessary and they seem to be perfectly at rest.

In the black-fish at rest upon the bottom, motion

may cease entirely, except for the rhythmic movements of the tips of the gill covers and an occasional slight turn of the eyeball. With some fishes in this position "dozing" seems certain, as the leaning body may settle over farther and farther until the fish recovers itself with a start and assumes the original upright position.

A lazy black-fish may roll over on its side and lie quietly until disturbed by its fellows. There is generally enough movement of some kind in an Aquarium tank to keep the fish somewhat wakeful,

the eyeballs occasionally rolling from mere habit of alertness. Inside the half-open mouth of the black-fish at rest a rhythmic tongue motion is visible. The pectoral fins in a resting fish are thrown out as props against adjacent objects, either a stone or another fish at rest.

A fish resting partly on its side may use the under pectoral as a prop, the upper one being folded flat.

A red grouper stowed comfortably in a narrow crevice in the rocks comes about as near to a condition of actual rest as it is possible for a breathing fish to effect. It may remain practically without movement for a long time except for the slow action of the tips of the gill covers. The body appears to cling closely to the rocks.

A red hind at rest turns very pale, the red color disappearing almost entirely; body and fins are pressed closely to the rockwork, the pectoral fins being thrown out at any angle as a prop.

The coney (*Bodianus fulvus*), in a resting position has the dorsal fins lowered and the rays of the tail fin slightly folded together. The pectoral fins, as in some other fishes at rest, are sometimes used as a prop against the tank, the fish being without motion except the tip of the gill cover.

A vertical position is often assumed by the red hinds. The color of the fish at rest is nearly always different from that when in motion. The fish may stand in the corner of the tank resting directly on the tail, the tip of which is sharply bent.

Very often the movement of the jaws and eyes almost ceases.

In the puffer (*Spheroides maculatus*) at rest, the fins are closely folded, and the fleshy folds above and below the eye, which have almost the form of eyelids, cause the eyes to appear closed, or nearly so. In the respiration of the fish there is practically no movement of the jaws, which are carried about half open. The body shows a slight breathing movement in unison with the slow and almost imperceptible movements of the tips of the gill covers.

There seems to be little doubt that many of these resting positions indicate sleep.

DO FISHES HEAR?

DURING recent years experiments have been made which make it possible to answer this question in the affirmative, for some kinds of fishes at least.

Fishes are well known to be sensitive to disturbances of the water, but are usually not affected by noises made above the water except when it amounts to a heavy concussion.

It has been found that fishes, reported to approach their keeper at the ringing of a bell, will also do so without the bell being used, while the ringing of the bell will not bring them if the keeper remains out of sight.

Sounds produced under water and scarcely distinguishable in the air may be heard distinctly by placing the head under water, while sounds produced in the air are scarcely heard when the head is immersed.

According to Professor Parker of Harvard, who made repeated experiments with a view to testing the hearing powers of fishes, "the plain separating air and water, is under ordinary circumstances, an almost impenetrable one for most sounds whether they are generated on one side or the other of it." Experiments made in transmitting sounds under the



YELLOW-FIN GROUPEE.

water have lead Professor Parker to state that there are fishes which do hear.

Bigelow's experiments with the goldfish lead him to the conclusion that it possesses the sense of hearing.

Although fishes have no external ears, they possess the internal organs of hearing in some form. There can be little doubt that the sounds made under water by many kinds of fishes are audible to others of their own species.

HAVE FISHES MEMORY?

IN view of the well known facts that fishes can be frightened and become wild, that their confidence can be gained to the extent of making them tame so that some of them will permit handling, that they learn to come at certain times to certain places to be fed, that habits learned in the Aquarium are sometimes resumed after the fish has been liberated for months in a pond and then returned to the Aquarium, and that some fishes which have been injured by the hook, and escape, are afterward difficult to capture, it is natural to conclude that they have some power of memory.

The seasonal movements of fishes, certain actions in the Aquarium which resemble play, and the sounds which they make, also indicate that they remember in a measure what they have done before.

In a lengthy paper on this subject, published in 1899, after considerable experiment Edinger arrived at the conclusion, that impressions once received by the fish can be retained, and he does not hesitate

to state that vertebrates as low as fishes possess a kind of memory. It is a simple process, however, and there are no facts to show that it is accompanied by the mental process of associating ideas.



FOUR STAGES OF DEVELOPMENT OF THE COMMON FROG.

AMERICAN FISHES IN NEW ZEALAND AND SOUTH AMERICA.

THE Inspector of Fisheries of New Zealand, Mr. L. F. Ayson, was in this country recently, on his second trip, for the purpose of securing additional American fishes to be introduced into New Zealand.

The method of transportation practised by the modern fish culturist is to ship the eggs rather than the fish. Artificially fertilized and half-hatched eggs are placed in damp moss in a series of small compartments in the shipping case, the latter being protected with an outer casing supplied with ice.

The resulting low temperature arrests development without injury to the eggs. In this condition, partially hatched eggs of fishes are regularly shipped about the United States from one hatchery to another, the incubating process being completed at the hatchery nearest the waters to be stocked with young fry.

Large quantities of fish eggs have been carried successfully by employees of the United States

Fisheries Bureau across the tropics to New Zealand and South America. Millions of eggs of California salmon, trout, white-fish, etc., have reached New Zealand with less than five per cent loss, after an ocean trip of twenty-six days from San Francisco. When Mr. Ayson visited the New York Aquarium he said there was good sport-fishing for American fishes in several lakes and streams of New Zealand.

The eggs of American salmon, trout, and white-fish, over a million in number, sent to the Argentine Republic, were transported a greater distance than has heretofore been recorded in the history of fish-culture. After the sea voyage they were hauled by wagon over 200 miles in warm weather to a hatchery in the mountains, where they were finally hatched with a loss of less than ten per cent.

Messrs. Titcomb and Tulian of the United States Fisheries Bureau, after carrying this splendid work to its successful conclusion, both visited the Aquarium on their return and gave an interesting account of their building of the first fish hatchery in South America.

BOOKS USEFUL TO THE AQUARIST.

THE following list of books relative to aquaria is limited to such as happen to be contained in the library of the New York Aquarium, and is presented here as a matter of interest to members of the New York Zoological Society, school teachers, and other persons, in response to many inquiries respecting books on the care of home aquaria.

The bibliography of this subject is extensive, and the works here mentioned are not claimed to be the only desirable ones of their class, although they will all be found useful. Those issued by New York publishers are for sale by booksellers generally. Some of them can be imported to order, while the older works are out of print and must be sought for among the shelves of dealers in second-hand scientific books.

The titles of two works on the smaller forms of life found in ponds and streams and along the seashore are included, as they deal with the natural history of species usually suitable for marine and fresh-water aquaria. One of these is "Sea-Shore Life," which has just been issued as the first volume of the New York Aquarium Nature Series.

C. H. T.

The Home Aquarium, and How to Care for It.—A guide to its fishes, other animals, and plants; with many illustrations. By Eugene Smith. Duttons, New York, 1902.

The Amateur Aquarist.—How to equip and maintain a self-sustaining aquarium. Illustrated. By Mark Samuel. Baker & Taylor Co., New York, 1894.

The Goldfish, and its Systematic Culture.—A thorough guide for goldfish keeping and goldfish breeding in the house and out of doors. The construction and care of the parlor aquarium and ponds for breeding. Illustrated. By Hugo Mulert, New York, 1902.

The Book of Aquaria.—Being a practical guide to the construction, arrangement, and management of fresh-water and marine aquaria. Illustrated. By the Rev. Gregory C. Bateman, A.K.C., and Reginald A. R. Bennett, M.A. Part I—Fresh-water Aquaria. Part II—Marine Aquaria. Scribner's, New York, 1902.

The Aquarium.—Its inhabitants, structure, and management. Illustrated. By J. E. Taylor, Ph.D. New Edition. Grant, Edinburgh, 1901.

The Vivarium.—Being a practical guide to the construction, arrangement, and management of

vivaria. Illustrated. By the Rev. Gregory C. Bateman, A.K.C. Gill, London, 1897.

The Aquarian Naturalist.—A manual for the seaside, with a chapter on aquaria. Colored plates. By Thomas Rymer Jones, F.R.S. Van Voorst, London, 1858.

The Aquarium.—An unveiling of the wonders of the deep sea, with colored plates. By Philip Henry Gosse, A.L.S. Van Voorst, London, 1854.

The Fresh and Salt Water Aquarium. With colored plates. By Rev. J. G. Wood, M.A.F.L.S. Routledge & Sons, London, 1868.

Ocean Gardens.—The History of the Marine Aquarium, and the best methods now adopted for its establishment and preservation. With colored plates. By H. Noel Humphreys. Sampson Low, Son & Co., London, 1857.

Popular History of the Aquarium of Marine and Fresh-Water Animals and Plants.—With colored plates. By Sowerby, F.L.S. Reeve, London, 1857.

Ocean Wonders.—A companion for the seaside. With a chapter on marine and fresh-water aquaria. Illustrated. By William E. Damon. Appleton's, New York, 1896.

Life in Ponds and Streams.—With a chapter on aquaria. Colored plates. By W. Furneaux, F.R.G.S. Longmans, Green & Co., New York, 1896.

Sea-Shore Life.—The invertebrates of the New York coast. (Volume I of the New York Aquarium Nature Series.) Illustrated. By Alfred G. Mayer. For sale at the Aquarium, and by A. S. Barnes & Co., New York, 1905.

"SEA-SHORE LIFE."

THIS book on the invertebrates of the New York coast and the adjacent coast region was published last fall as the first volume of the New York Aquarium Nature Series.

It is a book of 181 pages and 119 illustrations, nearly all from original photographs by the author, Dr. A. G. Mayer, Director of the Marine Biological Laboratory at Dry Tortugas, Fla.

It is a popular account of the mollusks, crustaceans, star-fishes, jelly-fishes, sea anemones, and many other invertebrates common along the North Atlantic coast, but is, at the same time, thoroughly reliable from a scientific point of view.

It has been a good seller ever since it was placed on sale at the Aquarium, and the Zoological Society is to be congratulated on having so valuable a work to head the list of publications emanating from the New York Aquarium.

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FINAL STAGES IN THE REMODELLING OF THE AQUARIUM.

The long-continued task of remodelling the New York Aquarium is drawing to an end. With the introduction of new boilers and a mechanical ventilating system, just completed, the more expensive changes, outlined three years ago, may be considered accomplished facts. The various improvements made have materially changed the methods of the institution, and after the work of the present contractor is completed, they will permit of many important additions to the collections and greater effectiveness in their display and preservation.

The following list of improvements to date, made from the Aquarium Improvement Fund—so willingly supplied by the city authorities—will

be of interest to those members of the Zoological Society who have not observed their progress, step by step:

The construction of an underground reservoir for sea-water.

The construction of filters for sea-water.

The construction of pipe-galleries under the building.

The enlargement of forty-three skylights.

The erection of larger boilers.

The introduction of a ventilating system.

Alterations to correct unsightly features of the building.

The artificial aëration of the tanks.

The painting of the interior.

The work has been done without interfering with the constant use of the building by the public and without the removal of any of the exhibits.

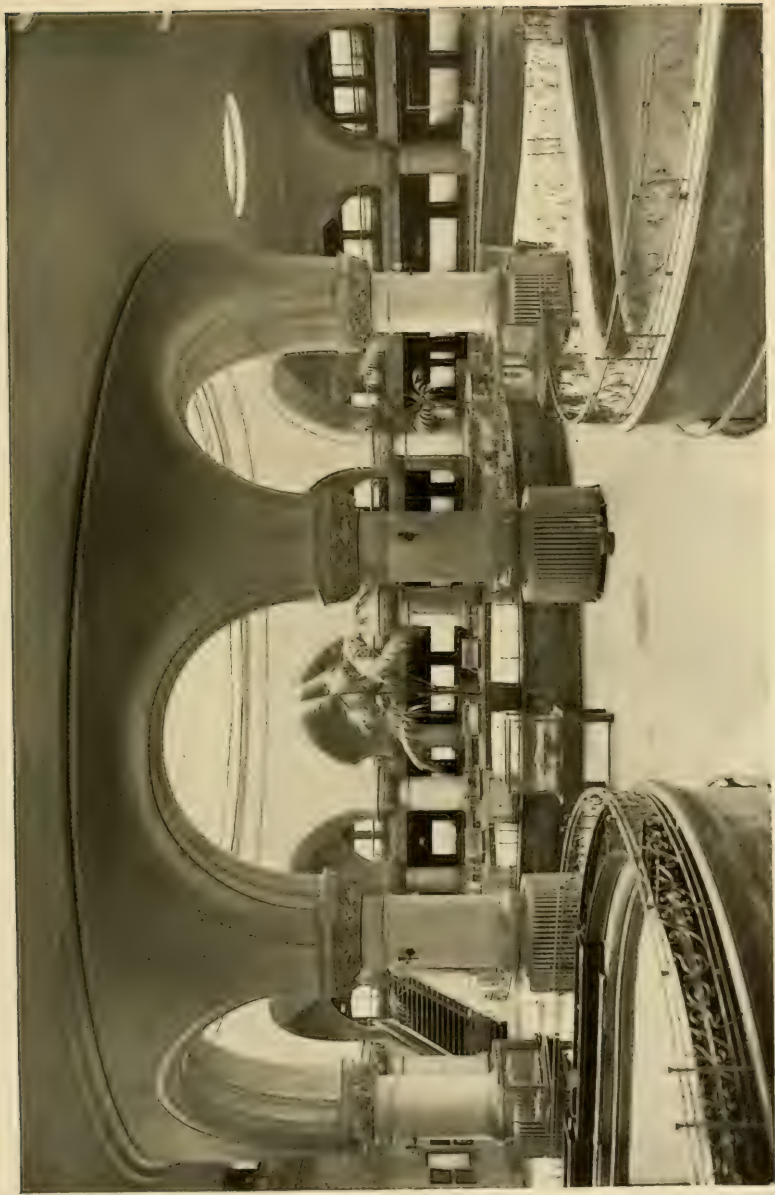
The replacing of rusted-out piping by lead-lined pipe will continue for some time longer. This troublesome task, which will involve the actual emptying of all salt-water exhibition and reserve tanks, will be accomplished by cutting off but two or three tanks at a time. Visitors will probably not be aware that it is going on, as the work will be done behind the "scenes," and without materially reducing the exhibits at any one time.

It is to be regretted that most of the work done is of such a character that the public cannot be expected to appreciate it, since it is connected with the mechanical workings of the establishment. But it means greater efficiency and reduced cost of operation, this to be followed by increased exhibits in a more attractive setting.

It is due to the management to explain that the modernization of the Aquarium has been slow and difficult because of its location within the eight-foot-thick walls of an ancient fortress, where nearly all work connected with its improvement had to be crowded into the limited space behind the hundred exhibition tanks.

It is now hoped that the reduced cost of operation will later on permit of the Aquarium being opened to the public at night, without increasing its present maintenance fund.

During the past three years the attendance has increased at the rate of 75,000 to 100,000 visitors a year. The attendance for 1905 was over 1,700,000 persons.



MAIN HALL OF THE NEW YORK AQUARIUM.

Showing the small aquaria which have been placed around the large center pool, and the increased lighting gained by the new sky-lights.



THE GIANT SALAMANDER.

This specimen is 30 inches long, and has been in captivity six years.

GIANT SALAMANDER.

THE Giant Salamander (*Cryptobranchus japonicus*), in the Aquarium has been growing slowly and is now thirty inches long. It was received at the Zoological Park just six years ago, and was transferred to the Aquarium three years later.

This species inhabits mountain streams of China and Japan and has been found 4,500 feet above sea-level.

A specimen taken to Europe in 1829 by Th. von Siebold, who discovered it, lived fifty-two years in captivity.

The largest specimen known measured a trifle over five feet in length. This species is very closely related to the American hellbender (*Cryptobranchus alleganiensis*), which is kept in the same tank, but differs from it in having no gill openings whatever. During the larval stage it possesses external gills. It has bred in captivity in the Amsterdam Zoological Gardens.

SOUNDS MADE BY FISHES.

AMONG the fishes usually to be seen at the Aquarium are several kinds which make croaking or drumming sounds. These are grunts, croakers, drums, sea robins, weakfish, kingfish, etc. They are nearly all sea fishes, more or less abundant in New York waters, although the fresh-

water drum of the Great Lakes and Mississippi Valley is equally famous for the sounds it makes. The sounds are made in different ways, some fishes always producing them when taken from the water.

At night, when on board a schooner anchored in certain shallow bays in Central America, I have heard the continuous croaking of hundreds of fishes underneath the vessel.

At the Woods Hole marine laboratory of the United States Fisheries Bureau, the drumming mechanism of fishes has been studied and experimented upon by Prof. W. R. Tower of the American Museum of Natural History, who kindly furnished the BULLETIN with the following notes on the subject:

THE VOICES OF FISHES.

By Prof. R. W. Tower.

Although many fishes make distinct and characteristic noises, described as drumming, grunting, grating, snoring, or singing, these sounds are in no way related to the voice of man.

The grating noise made by the common bull-head, the three-spined stickleback, and certain trigger-fishes is produced by the rubbing of one bone upon another, which in many instances are specially modified for this purpose. Among such bones may be mentioned the vertebrae, certain bones of the head, and bones in fins. The rubbing of one hard part of the body upon another so as to produce a sound is known as stridulation. It can

be artificially produced on a dead fish by manipulating the parts concerned. Stridulation is not confined to one species of fish but has been heard in animals of widely separated families. The harsh noise produced by the rubbing together of the pharyngeal teeth in one species of mackerel and by the grating of the "incisor" teeth of the puffer or swell-fish might also be classified under stridulation.

In certain fishes whose air-bladder opens by a duct into the digestive tract (stomach or oesophagus) a noise is made by the forcing of gas from the air-bladder through the air-duct (*ductus pneumaticus*) and mouth. Noises are produced in this manner by the eels, the carp, and certain loaches and are frequently spoken of as breathing sounds, although in no way connected with the phenomenon of respiration.

The drumming noises made by many of the *Sciaenidae*, such as the drum, the weakfish (*Squeteague*), and the croaker, are produced by a unique, specialized muscle which undoubtedly has been developed for the purpose of producing sound. This muscle with its tendons forms a closed cavity in which is contained the air-bladder and remaining abdominal organs. By the contraction of this muscle all of the abdominal organs are made to vibrate, especially the air-bladder. The vibrations are of such a character as to make a low sound which under the rapid contraction of the drumming muscle produces the effect of a roll on a drum. In most of these fishes it is only the male that possesses the special muscle and consequently only the males make the noise. The drumming can be readily observed in a male squeteague placed in a small aquarium and under the proper conditions. The drumming of a weakfish can be distinctly heard many feet away, and if removed from the water the noise can be easily recognized thirty or more feet distant. It is undoubtedly a call of one fish to its mates.

A noise which is best described as a grunt is produced by many fishes of the family *Triglidae*, the most common examples being the red-winged sea robin and the toad-fish. These animals possess a more or less two-lobed air-bladder which is equipped with two muscles, one on each lobe. These muscles apparently form part of the wall of the air-bladder, and by their contraction the wall is made to vibrate in such a way as to produce a single distinct grunt. Often when a toad-fish is

taken from the water in a net, the grunt made by this animal will be heard some distance away. The same noise can be produced artificially by stimulating the muscle with an electric current soon after the death of the animal.

Among the *Siluridae* or catfishes is found still another apparatus which some consider to be a mechanism for the production of sound. The transverse processes of the fourth vertebra are extended backward, ending in bony plates embedded in the front part of the air-bladder. These processes, which thus form elastic springs, are connected with the head region by two powerful muscles. By the contraction and relaxation of these muscles the air-bladder is set into vibration, which produces a sound.

That certain fishes do produce characteristic sounds which undoubtedly serve a distinct purpose to the animal is a fact which has been proved by observation and experiment and can be verified with comparative ease. Much, however, remains to be learned about this very interesting subject.

THE SUNAPEE TROUT.

THE Aquarium recently received several specimens of the beautiful golden trout of Sunapee Lake.

This species, known as *Salvelinus aureolus*, is found only in Sunapee Lake, N. H., Flood Pond, Me., and other lakes in that region. Since it was described as a new species a few years ago, it has been introduced into other lakes.

It is a trout of large size, known to have reached a weight of eight pounds. The Aquarium specimens are about eighteen inches in length. It remains habitually at considerable depths, where the water has a temperature below fifty degrees, and is taken chiefly with live bait.

The specimens in the Aquarium, which appear to have lost color since their arrival, are of a pale brownish color above, the head being lighter, and the sides have faint orange spots. The entire under surface, including the fins, is of a pale orange color. The front edges of the fins are broadly margined with white.

The species is so closely related to the European char that it may have been introduced into this country. It was not known to anglers until about twenty-five years ago.

So far the fish culturists have not found it difficult to propagate artificially. It has been introduced into Lake George and other New York waters. This fish should not be confused with the recently described golden trout of the high Sierras of California.

HOW FISHES CHANGE COLOR.

OF the sixty or more different kinds of tropical fishes which may be seen in the Aquarium from time to time, there are a large number which have power to change their colors very quickly. Among these may be mentioned the different hinds, groupers (*Epinephelus*) and the coney (*Bodianus fulvus*).

The changes are often very marked. A grouper of a pale coloration, showing very few markings and swimming near the surface of the tank, may settle to the bottom and in a moment reveal all its characteristic dark bands very sharply. A coney, appearing chiefly red, may in a few moments put off the red color entirely, turning uniformly pale; a little later the lower half of the body may become almost white, the upper half at the same time being very dark.

A tropical fish swimming actively about its tank has usually a different coloration than that assumed when at rest. Settling down upon the white gravel or hiding among the dark rockwork, it is quite likely to adapt its color accordingly. Fishes reflect their surroundings very readily. While the colors of some fishes are developed chiefly during the season of courtship, with most species they are connected with the need of protection and in many cases may be developed almost instantly.

The frightening of tropical fishes which change color readily, almost always results in a change of some character. When fishes change color the change corresponds of course with the color-changing ability of each particular species.

The color cells of fishes, known as *chromatophores*, lie in the deeper layer of skin; and the tints, whatever they may be, are brought about by the contraction and expansion of the cells as they assume a flat, globular, or other form.

It is the spasmodic action of the cells which gives to the dolphin its celebrated color-changes during its death convulsions. The cells may contain blue, yellow, red, or other pigment, some colors being

produced by the combined action of different colored cells.

The iridescence of fishes is produced in another way. It is due to the presence of *reflecting tissue* and depends upon the way in which the light is reflected from it.

FOUR YEARS OF CHANGE IN THE AXOLOTL.

THE axolotl, as at present understood, is the larval or gilled form of a salamander, eight or nine inches in length, known as *Amblystoma tigrinum*.

It inhabits certain waters of the United States, extending southward as far as Central Mexico.

Although long supposed to be a species with permanent gills, it was discovered, from specimens kept in captivity, that the gills were gradually absorbed and the animal became the land-living *Amblystoma*.

It was also discovered that the animal sometimes bred in its larval stage, without waiting for the final stage supposed to be necessary for sexual maturity.

A specimen which has long been undergoing transformation in its tank at the Aquarium was recently photographed in order that its appearance might be compared with its appearance as recorded by a photograph taken four years ago. The two pictures shown on page 281 indicate more or less clearly the changes which took place.

When the first picture was made there were four axolotls in the tank, all about the same size and with gills alike.

The second picture shows one of the animals with its branching gills reduced by slow absorption to mere useless stubs. As a breathing apparatus the gills gradually failed until the axolotl had to go to the surface of the water when in need of air. All these specimens were of the white or flesh-colored variety.

A letter has just been received from Dr. S. E. Meek, of the Chicago Museum, in reference to the metamorphosis of the specimens in the Aquarium. He expresses the opinion that in the literature of the subject generally two species have been confused and that the original "axolotl," *Amblystoma mexicanum*, inhabiting lakes near the city of Mexico, is an entirely distinct species, as was believed by Professor Cope.



SPECIMENS OF THE AXOLOTL, NEW YORK AQUARIUM.

Dr. Meek, like Professor Cope, studied both forms in their native localities. He says the Mexican axolotl and the larvæ of *A. tigrinum* of the same size do not look alike and believes that the former has not yet been demonstrated to have passed the stage of external gills.

He is of the opinion that all so-called axolotls, studied in aquariums in Europe and elsewhere and observed to lose their gills and to breed in the larval stage, have been *A. tigrinum*. It is certain that all specimens in the New York Aquarium and the New York Zoological Park belong to that species.

Dr. Meek collected many specimens of *Amblystoma tigrinum*, in both larval and adult stages, in a locality about forty miles west of the city of Chihuahua. He then got "axolotls" from Patzcuaro Lake and other lakes near the city of Mexico.

It is possible that the axolotls from lakes in the arid region about the city of Mexico do not pass the larval stage.

An effort will be made to procure specimens from the latter region for the purpose of determining whether *Amblystoma mexicanum* really passes through the stages already demonstrated to occur in *Amblystoma tigrinum*.



THE AXOLOTL.

One of the above specimens photographed four years later, in 1905.



SHIPPING BERMUDA FISH.

Showing the style of tank used in carrying tropical fish.

Notes.

Fish Hatchery.—During the winter the fish hatchery at the Aquarium has been constantly in operation.

The first eggs received were those of the Pacific Coast humpback salmon; these were followed by eggs of the lake trout, rainbow trout, and white-fish.

In the January number of the BULLETIN attention was called to the successful feeding of young white-fish on mosquito larvae. This food proved entirely satisfactory in carrying the fry through the most critical period of infancy. These fishes are now nearly one year old and have required no live food since last fall.

The exhibition tanks now contain fry, yearlings, two-year-olds, and three-year-olds

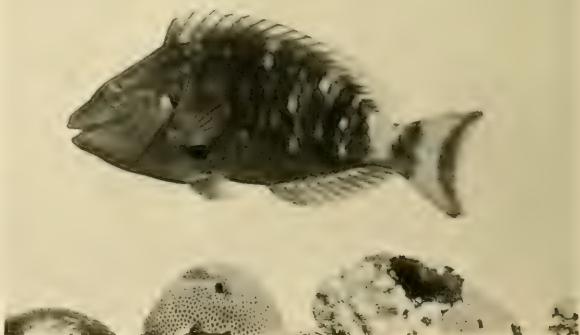
of various kinds of trout, salmon, and white-fish, all raised in the building from eggs, and the surplus of young fish from the hatchery (over two millions) was turned over to the New York Fish Commission during the past year.

Bermuda Fishes.—In this number will be found five excellent pictures of Bermuda fishes; the yellow-finned grouper, yellow tail, red hind, parrot fish, and hog fish.

None of these species have hitherto been so successfully photographed at the Aquarium. They are all members of the gorgeous tropical collection which adds so much color to the exhibits. The accompanying photograph shows the style of tank in

which they are shipped from Bermuda to New York.

Large Specimens at the Aquarium.—In addition to the big sea turtles mentioned elsewhere, the Aquarium has sturgeons seven feet long, an alligator



GREEN PARROT FISH.



YEARLING RAINBOW TROUT.

Hatched in the Aquarium.

eleven feet long, an American crocodile nine feet long, several drum-fish, each weighing over fifty pounds, and two green morays, six feet and seven feet long respectively. The seven-foot dolphin, on exhibition last summer, was injured in capture and lived only a week. The sturgeons have lived in the building two years, the alligator four years, and one of the green morays four years.

Blind Fishes from Mammoth Cave.—Nearly a year ago the Aquarium received a couple of blind fishes from Mammoth Cave, Kentucky (*Typhlichthys subterraneus* and *Chologaster agassizii*), which have been living comfortably in a small glass aquarium ever since.

The former is of a pale brown color and the latter a pale pink, about as colorless as the average albino fish, and their rudimentary eyes are so small as to be scarcely noticeable, and appear to be quite useless.

Both specimens feed freely and have increased slightly in size. They have been fed exclusively on Gammarus, a

small marine crustacean, usually obtainable from the bunches of sea-weed brought in by the Aquarium "collector."

The *Typhlichthys* is about two and one-half inches long. The other is smaller. Both were presented by Mr. B. F. Einbigher.

Albino Lake Trout.—Some time ago the Aquarium received from the New York State Fish Hatchery at Saranac Inn a number of specimens of albino lake trout. They were hatched in February, 1905, from eggs taken at Lake Clear, Franklin Co.,

N. Y., in October, 1904. About fifty albinos were found among the fry produced from 120,000 eggs. The specimens are all of a pale golden color and with pink eyes.

Bluefish in Captivity.—One of the tanks at the Aquarium contains a couple of bluefish (*Pomatomus saltatrix*) which have been in the building over a year and a half. This is a good record for this wild oceanic fish in captivity, specimens exhibited



A LAKE ERIE WHITE-FISH.

It has lived four years in the Aquarium.



BERMUDA HOG FISH.

previously at the Aquarium seldom living longer than a year.

When they arrived on September 6, 1904, they were four inches and six inches in length respectively. The larger specimen is now twenty inches long and the other nearly as large. They are both handsome specimens, in fine condition, and are very active.

The wall tanks at the Aquarium afford very little swimming space for active fishes. They would probably do better in one of the large floor pools where there is more room. The brackish nature of the water is also injurious to ocean fishes. These specimens have been fed on minnows, herring, and shrimps.

* * *

The Grunts.—The blue- and yellow-striped grunts at the Aquarium often engage in a performance which may be described as "sparring."

A couple of these fishes advance toward each other until the tips of both the upper and lower jaws touch those of the opposing fish, then follow something like wrestling movements as they

endeavor to push each other backward.

During the play, if it be such, the mouth of each fish is opened to the fullest stretch so that the vermilion interior is revealed as a bright spot of color in the amusing picture.

The grunts have rather plain hues except for their numerous blue and yellow bands, and the sudden opening of the mouth displays an unexpected color which is almost startling.

This sparring among the grunts can often be started by attracting the fishes to the glass front of the tank by touching the glass with the outspread fingers. The fishes press forward as they gather together at feeding time, and, finding nothing to eat, one or more pairs may attempt to crowd each other away, threatening or sparring with the open mouth in the manner described.

On approaching the glass, against which the fingers may be placed, the grunts frequently open the mouth. The tips of the wide-opened jaws will be pressed against the glass following the movements of the finger on the other side. The sparring is more frequent if the fish are hungry.



BERMUDA YELLOW TAIL.

ZOOLOGICAL SOCIETY BULLETIN

No. 22

PREPARED BY THE NEW YORK ZOOLOGICAL SOCIETY

July, 1906

THE NEW RHINOCEROS

THE only specimen of the now rare two-horned, black African Rhinoceros which has come to America in the last eight years, with one exception, has been purchased by the Society and is now one of the valued possessions of the Zoological Park.

Learning of the arrival in Europe, from the Kilimanjaro District, German East Africa, of a rhinoceros, we cabled an offer and promptly secured the animal. The transportation was effected without trouble of any kind, the rhinoceros reaching the

park on June 1st and was safely quartered in the Antelope House, where she has been on view ever since. The anterior horn is already quite prominent and the posterior one just appearing. The color of the skin on the back is very light, darkening on the under parts. It is perfectly proportioned, bright and energetic, and is entirely satisfactory as an exhibit.

It is a young animal, possibly two years of age, weighs about three hundred pounds, is thirty-one inches high, fifty-six inches long from snout to base



TWO-HORNED BLACK AFRICAN RHINOCEROS.

From a photograph of a young specimen now in the Zoological Park.

of tail, and is apparently in perfect physical condition. Considering the rarity, the price paid was not excessive, yet it can be safely mentioned that no other animal in the collections either exceeds or

nearly equals the cost of this specimen. The German keeper who accompanied her, *en route*, still has her in charge until the park keepers become familiar with her habits and diet. E. R. S.



YOUNG ALLIGATORS IN THEIR SUMMER HOME.

Since the Sea-lion Pool in Baird Court was completed, the alligators have been transferred to the pool near the Reptile House, formerly used by the Sea-lions.

THE COLLECTION OF CROCODILIANS.

EXCEPT for the distinct difference in the outline of the snout, the various crocodilians look very much alike to the popular observer. Among all there is the rough, plated armor of the back, the dull, monotonous coloration and always the semi-aquatic habits. From the standpoint of habits, however, we may draw some sharp definitions. Over forty specimens, representing four species of crocodilians, are now living in the Reptile House. The species exhibited are the Salt Marsh Crocodile, *Crocodylus porosus*—known as the Man-eating Crocodile, of Malaysia; the Florida Crocodile, *C. americanus floridanus*; the American Alligator, *Alligator mississippiensis* and the Spectacled Caiman, *Caiman sclerops*, of Central and South America. One more species is needed to make the collection thoroughly representative. This is the Indian Gavial, having a snout so elongated and slender as to look like a tooth-studded beak. Gavials are common enough in the Ganges

and other rivers of northern India, and the various zoological institutions are always on the lookout for specimens—without avail. Here lies the chance for some enterprising person returning from the East to readily dispose of, among the zoological institutions of both Europe and America, a number of animals hardy in shipment. Incidentally it might be explained that the Indian Gavial reaches the greatest size of any of the crocodilians—a length of thirty feet.

The second largest of living crocodilians, the Salt Marsh Crocodile, is represented in the Park by a thriving young specimen nine feet long. In spite of the fact that this species is a bold reptile and a notorious menace to human life, our example at the present time has a lamb-like disposition, living in comparative harmony with the big colony of alligators. For several weeks it valiantly tried to hold its own against the aggressive actions of our big Florida crocodiles, but was so vigorously mauled that it lost all its fighting spirit, retreated to the sand-bank, and would not go into the water for food. Hence its transfer to the big alligator colony

in the old sea-lion pool. The distribution of *Crocodilus porosus* is the most extensive of any member of its family. It inhabits the coast swamps of India, Malaysia, and northern Australia, even occurring on small isolated islands in vast expanses of the eastern oceans. This may be accounted for by the bold swimming habits of the species. Specimens are often sighted by vessels when several hundred miles from land.

It is only in the extreme southern portion of the Florida peninsula that a crocodile occurs in any portion of the United States. It represents a species abundant in Mexico and Central America. This freak occurrence was probably caused by the species crossing the Gulf of Mexico, possibly from Yucatan, to the Florida Keys. Certain it is that this species is often seen afloat in the Gulf. It literally infests some of the coast swamps of eastern Central America.

Situated as they are in a barred-off portion of the inside pool, our Florida crocodiles illustrate well, when compared with the three giant alligators in the adjoining enclosure, two important characters—the exceedingly narrow, sharp-pointed snout of the American Crocodile, as compared with the blunted and rounded snout of the alligator, and the distinctly olivaceous hue of a crocodile, which is quite different from the dull black of an alligator, while in their movements the crocodiles are far more supple and active. They are also so irritable that it is impossible for the keeper to enter their enclosure, though the men walk all about the large alligators, even stepping over the creatures' backs. The two fine examples in the Reptile House were the gift of Mr. A. W. Dimock.

Our series of alligators varies from a twelve-foot giant whose roar shakes the building, to tiny eight-inch specimens brought north by tourists as Florida souvenirs. Midway between these two extremes are a number of specimens of all sizes. The most valuable ones are the five that were hatched in the Reptile House in 1901. At the time of hatching they were six inches long and weighed one and three-quarters ounces. They are now nearly six feet long and each weighs seventy pounds. The observations on the growth of these specimens are steadily disproving old theories. Another interesting alligator, an example of partial albinism, is seven feet in length.

A single representative of the Central and South American genus, *Caiman*, is living in the outside pool. This is a nearly mature specimen of the Spectacled Caiman, (*C. sclerops*), so called because the eyelids are so rough and protruding that they suggest the frame of a pair of spectacles. The Caimans have rather a sharp snout, like the crocodiles, but from a structural point of view, they are more nearly related to the alligator, as the lower teeth, the fourth on each side of the lower

jaw—the pair of canine teeth—fit into a *pit* in the upper jaw and are thus concealed when the jaws are closed.

R. L. D.

THE AUTOMATIC-GUN CAMPAIGN

EARLY in the present year it was decided to raise a special fund for use in the Zoological Society's campaign to establish the principle that the deadliness of firearms aimed against wild life must henceforth be limited. With the consent of the Executive Committee a circular call was prepared, and as funds were needed it was sent out to annual members of the Society.

If any additional proof had been needed to show the keen interest of the members of this Society in our efforts to protect wild life, that call for funds furnished it. The responses were quick, generous, and willing. The letters of encouragement that accompanied many of the checks were most gratifying and helpful. With but few exceptions, the remittances were for sums from \$5.00 up to \$25.00. From 140 persons we received a total of \$1,003.00, every cent of which was immediately acknowledged, and turned over to the Society's Treasurer, Mr. Percy R. Pyne. Expenditures were made very economically, and the fund lasted to the end of the winter and spring campaign. Mr. Shields, the Society's special agent for game protection, devoted nearly his entire time to work in the legislatures in which our bills were pending. The gallant work he did will yet bear fruit. A portion of his report of it is reproduced herewith.

For the generous and prompt support and encouragement which we have received in this special campaign fund, we are deeply grateful. There is not the slightest question regarding the sentiments of the 1,700 members of this Zoological Society regarding the protection of wild life in America.

W. L. H.

HUNTING SONG BIRDS STOPPED

EVERY Sunday since April 1st a tour has been made to some part of Westchester County, north of New York City, in search of Sunday bird-hunters, and during that time not a man with a gun has been seen nor have the sounds of fire-arms been heard.

Inquiries were made of many people along the way if they had seen hunters or heard of any shooting, and not a single offence has been reported.

This is the direct result of the vigorous crusade which the Zoological Society's game-wardens, John Rose and Rudolph Bell, made on the bird-hunters last summer and fall. For years past, hundreds of Italians have hunted every Sunday all over Westchester County, but when this organized raid was made on them the practice was stopped in short order.



THE VENEZUELAN BOA.

A NEW BOA FROM VENEZUELA.

THROUGH the courtesy of Mr. R. R. Mole, of Port-of-Spain, Trinidad, the collection of serpents has been enriched by the largest and finest specimen of *Boa constrictor* ever exhibited in the Reptile House. The big fellow is eleven feet and seven inches long, but looks much larger owing to the proportionately very heavy body and large head. The body is five inches in diameter at the thickest part. These proportions are considerably in excess of the average boa, for the present species—the scientific name of which has been popularly applied to great serpents generally—is not one of the giants of the family *Boidæ*.

The new boa has an interesting history. It suddenly began a series of depredations about the town of Amacaro, Venezuela, stealing chickens, turkeys, pet dogs and occasionally a favorite cat. The visits of the reptile were invariably nocturnal and so irregular that it repeatedly avoided capture. At length its name became a terror to the housewives, and a regular watch was kept for the snake. This finally brought success, for it was discovered while on one of its anticipated marauding expeditions and a noose was worked over its head, then pulled tight. The noose cutting into its neck, making a wide scar which can yet be seen. In vain the powerful reptile thrashed about, striking

in all directions and hissing vigorously, but to no purpose, as it was finally dragged into a box.

Hearing of the capture, Mr. Mole hurried from Port-of-Spain to the Venezuelan coast, secured the snake and placed it in a comfortable crate, lined and padded this to keep out a cold draught, and shipped the reptile to New York.

The Trinidad steamer arrived in New York during one of our eccentric "cold waves" of the early spring, and when the boa reached the Park the crate was hurriedly opened, revealing, to all appearances, a dead snake. A bath-tub was quickly filled with water heated to about 100° Fahrenheit. Into this the snake was placed, and energetically rubbed and massaged. For over half an hour it showed absolutely no signs of life, when the tail moved slightly. This was a good sign, showing the creature to be actually alive, though by no means in a sure condition to recover, for with large snakes thus thoroughly chilled the lungs entirely collapse, in which condition the reptile may remain unharmed for some hours. However, if the dormant condition continues, the lung tissue becomes so congested that the first inhalation, coming with a return of necessary warmth, tears the delicate membranes, when there is an immediate hemorrhage and the reptile dies. It was this condition we feared, and the effect of the snake's first indrawn breath was watched with anxiety. Mas-

saging brought the desired results. The snake was seen to take a big breath and soon exhale it. Regular breathing followed, showing the creature to be in good condition. Before the reptile became vigorous it was accurately measured, an altogether unsatisfactory task with a large constricting snake in lively condition, owing to the writhing and the varied contortions assumed by the body. It required a period of nearly ten days for the snake to regain normal vigor. Then it struck viciously at whoever approached, evincing every symptom of a hearty interest in life. A few days later the snake began feeding and it is now in a thriving condition.

This boa is unusually dark for its kind, being almost black, and having but obscure traces of the brilliant yellow saddles to be seen on the backs of most specimens. Its peculiar coloration may be due to great age, or a life in an exceptionally thick and humid portion of the equatorial forest. Along the body are numerous deep scars, telling a mute story of battles with peccaries and agoutis that have finally succumbed to the snake's constricting powers.

R. L. D.

The greater number of the photographs of fishes and aquatic animals published in the April number of the BULLETIN were made by Mr. Sanborn, of the Zoological Park, and Mr. Spencer, of the Aquarium. These fish pictures are unusually satisfactory examples of this most difficult kind of photography.

It has been a custom for many years to procure certain fresh-water fishes for the Aquarium from the lakes in the various parks of New York City. Among the fishes obtained from the large lake in Central Park is the European Rudd (*Scardinius erythrophthalmus*), or Pearl Roach, as it is locally known. The history of its introduction is unknown and it occurs nowhere else in this country. The lake has long been overstocked with this and other species, with the result that the fishes, in general, have become somewhat dwarfed in size.

With a view to giving the Pearl Roach a chance to develop, and also to insure the safety of the race in the event of the Central Park lake being drained at any time, the Aquarium collectors transferred fifty specimens to the large lake in Prospect Park in 1901. Some of these have just been brought to the Aquarium, where their large size and handsome appearance at once attracted attention. They are more than twice as large as any received heretofore, while the vermilion color of the fins is brighter. From a length of about five inches they have grown to an average of twelve inches and are decidedly heavier in proportion. The improvement is doubtless due to superior conditions prevailing in the Prospect Park lake.

C. H. T.

A collection of sea-horses has just been received from Atlantic City, N. J. They were captured with seines in the lagoons just back of that city.

The Aquarium fish-hatchery has delivered to the New York Fish Commission nearly 1,000,000 fish-fry since January 1st. About 100,000 yellow-perch fry were placed in Cope Lake in the Zoological Park, where they will be available later on as food for sea-birds. The United States Fisheries Bureau has, as heretofore, supplied the Aquarium with fish eggs from government hatcheries.

While the California Sea Lion, which was transferred from the Zoological Park to the Aquarium in January, is thriving, as was half-expected its habit of loud barking proved annoying indoors and it was threatened with banishment. It barked almost continuously and could be silenced only by feeding. Instructions were accordingly given to feed it, whenever it was necessary, to keep it silent. Under this treatment it rapidly grew fat, and instead of sitting on the platform and barking, it took to the water and learned to amuse itself swimming. It now swims all day long, apparently enjoying the exercise, while the habit of barking has been practically abandoned.

Seals kept indoors do not live long unless they are active. The sleepy, lazy kind become tender, and die after a few months of pneumonia or fatty degeneration of the heart, while active seals will live for years. A West-Indian seal lived in the Aquarium five and a half years and a harbor seal eight and a half years, both individuals being of the energetic sort, swimming for hours each day, and it would be fair to say that they spent more than half the time in active exercise.

The new sea lion gives promises of being of the athletic, long-lived class, a comfort to his keeper and a source of pleasure to the public.

Master Edward Redfield, of Cloister, N. J., has presented five specimens of Muhlenberg's turtle. This species ranges from southern New York to eastern Pennsylvania, but is never common in the vicinity of New York City. It is of small size and easily identified by the brilliant orange spots on each side of the head.

The Aquarium is indebted to this young collector for annual donations of salamanders and turtles from the neighborhood of Cloister, and does not often get the Muhlenberg turtle elsewhere.

The members of the Society and their friends, will have an exceptional opportunity to purchase specimens of the various species of deer in the Zoological Park this autumn. Our herds having increased to such an extent that the surplus will, in all probability, be sold at auction. C. H. T.

DEVELOPMENT OF THE FOX SNAKE, (*COLUBER VULPINUS*).

Specimen immediately after birth.

BREEDING CAPTIVE SNAKES.

ASIDE from the fact that the Reptile House is a place for the instruction and interest of its many visitors, the work of obtaining for exhibition, labelling and caring for the collection is but a portion of the routine of the Reptile Department. Scientific observations are at all times being noted in detail. Investigations regarding the most suitable food, the breeding of reptiles, their growth, the toxic powers of certain snakes and the diseases to which the inmates of the collection are susceptible constitute part of the Curator's labors, for the gradual rated accumulation of such researches will furnish valuable material for our future lectures and publications. One of the most interesting phases of this scientific work is the breeding of captive reptiles. A few preliminary remarks in the BULLETIN upon this subject may not be amiss. As among all captive reptiles, the serpents breed most readily, a brief *résumé* of the investigations thus far conducted may appropriately be confined to the *Ophidia*. The results up to date have exploded numerous theoretical assertions and cleared a number of problems, previously without an answer of any kind.

As an example of what has been done in the Reptile Department it might be explained that among poisonous snakes giving birth to living young, numerous broods of six species of rattlesnakes have been born in the building, while among the other Pit Vipers young have been born from the Fer-de-Lance (*Lachesis atrox*), the Copperhead Snake (*Ancistrodon contortrix*) and the Water Moccasin (*A. piscivorus*); of the latter species, three generations are living in the Reptile House, the original pair—now eleven years in captivity—being a part of the writer's private collection that was installed in the Park shortly before the opening to visitors in 1899. Incidentally this record indicates the longevity of the Moccasin, the most hardy and the most deadly of North American snakes. Together with notes concerning the Pit Vipers (*Crotaline*), it is possible to make the remarkable state-

ment, through the courtesy of Mr. R. R. Mole, of Port-of-Spain, Trinidad, that the terrible Surocucu, or Bushmaster (*Lachesis mutus*)—the largest of all viperine snakes—belies the term of a true viper, as it actually deposits tough-shelled eggs, which apparently take a considerable time to hatch. As far as we know, the species is thus unique among all the members of the *Viperidae*.

The largest brood from any of our rattlesnakes consisted of twelve young. As a rule the North American rattlesnakes have a smaller number of young, seven to nine. This same rule applies to the North American Copperhead and Water Moccasin, although one brood of fourteen young from the latter species was noted. The South American Lance-Head Vipers (*Lachesis lanceolatus*, *L. atrox*, and *L. pictus*) have uniformly given birth to larger litters, twenty to twenty-four. With the exception of the rattlesnakes, the young of all the serpents mentioned have the tip of the tail tinged with vivid sulphur-yellow. At times they wiggle this member convulsively, when it looks much like a lively maggot. My friend Mr. Mole suggests that as the body-colors of the little reptiles harmonize most admirably with their surroundings, while the yellow tail is in striking contrast, the young reptiles employ this as a bait to attract frogs and small lizards, their principal food. During the latter part of their first year the rapidly growing snakes lose the decorative caudal hue except, peculiar to state, with a phase of the Copperhead Snake inhabiting Texas; with this wide-banded form the character is invariably persistent; further investigation may warrant the definition of a subspecies.

Among the Colubrine poisonous snakes, while observations have been restricted as to species, they have been of more decided importance. It has been demonstrated, despite the general assertion to the contrary, that the Indian Cobra (*Naja tripudians*) is an egg-laying—*oviparous*—snake. Not only have our cobras bred and deposited their eggs, but we have also succeeded in incubating the eggs by placing them in a medium composed of

damp sphagnum¹ moss. A fine cobra from the southern portion of the Indian peninsula deposited twenty perfectly smooth, tough-shelled, cream-white eggs. These were one and one-quarter inches long and seven-eighths of an inch in diameter. They were at once taken from the cage, placed on a layer of damp sphagnum moss in a large tray, then covered with a layer of the same material four inches in depth. The tray was hung in a room where the temperature averaged 90° Fahrenheit. Each day the incubating medium was moistened and the eggs examined. About fifty per cent of them proved fertile and, as they absorbed the moisture, grew slowly in size, assuming more spherical outlines. Those eggs that showed infertility were removed, owing to the danger of infectious mould. At the expiration of six weeks the tray was suspended within a gauze bag and the arrival of the young snakes awaited. In about eight weeks the young snakes attained their perfect development, and were then ten inches long.

Another interesting record is the hatching of Coral Snakes in the Reptile House. Our south-eastern species (*Elaps fulvius*) belongs to the same subfamily as the Cobra, but knowledge of its breeding habits is exceedingly meagre. Until last year efforts to procure the eggs of this species were quite without success. A small specimen finally deposited eleven eggs, which were placed in finely ground wood-pulp. Though these eggs were kept moist and warm, they required the lengthy period of thirteen weeks for incubation. The young were marked like the parent, but the scarlet, yellow and black rings were more brilliant. Compared with the latter, their brilliant, lustrous colors made them appear as if freshly squeezed from a paint tube. In form they were considerably more slender than the adult specimen, and dug like earthworms into the hatching medium.

Many species of the non-venomous snakes have bred in the Reptile House. Among these serpents have been both the *oviparous*—egg-laying—and the *viviparous*, those producing living young. Of the former, a Rainbow Snake (*Irbastor erythrogrammus*) deposited forty-four eggs, and of this lot all but one were hatched. The eggs of this little known species are proportionately small when deposited, but as they absorb moisture during incubation, they rapidly increase in size. Immediately before hatching, some of them were two and a half times their original size.



DEVELOPMENT OF THE FOX SNAKE. (*COLUBER VULPINUS*).

A freshly laid egg and one ready to hatch.

Among the harmless *viviparous* snakes large broods of young are the rule. One Striped Snake (*Eutania sirtalis*) gave birth to fifty-seven young. During last fall alone, several thousand striped snakes were born in the building. With so many young snakes, we are always looking for freak specimens, and it is not unusual to find a perfect albino or, more rarely, a specimen with two heads and necks on one body. Five of the latter were born in 1905. Such examples seldom feed, and live only a few days.

R. L. D.

Two hawksbill turtles, which are much larger and handsomer than any that have been received heretofore, were presented to the Aquarium by William Curry's Sons, of Key West, Fla. The larger one weighs sixty pounds, and its carapace (upper shell) measures twenty-six inches in length; and the other weighs fifty pounds, its carapace measuring twenty-four inches.

These turtles are seven or eight years old, and with several others of the same species were raised in captivity in a small salt-water pond into which the tide ebbed and flowed. They were placed in the pond when quite small—weighing perhaps three pounds—and fed on sea-weed, garden plants, clams, conchs, crabs, and chopped fish. This is interesting as showing how well the hawksbill lives in captivity, at least in its own climate.

The hawksbill, so named on account of the shape of its beak, and also known as "tortoise-shell turtle," furnishes the valuable "tortoise-shell" of commerce. A few years ago the yield of "tortoise-shell" in southern Florida was valued at \$1,500 to \$1,700 per annum, but the amount now annually taken is small.

The hawksbill inhabits the tropical Atlantic, and is common as far north as Florida and the Bermudas. A similar species is found in the tropical Pacific.

C. H. T.

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EDITED BY THE DIRECTOR

Elwin R. Sanborn, Asst. Editor.

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The honorary degree of Doctor of Science was conferred on our Director by the Western University of Pennsylvania on June 12th, Director William J. Holland, of the Carnegie Museum at Pittsburgh, representing him. With this honor comes the welcome news of Dr. Hornaday's recovery from his recent severe illness, which for many weeks has kept him from his accustomed place among us. Convalescence is so favorable and rapid that visits to the Park have now become possible, and there is every indication of a complete return to his former vigorous working strength.

E. R. S.

METHODS OF EXHIBITING REPTILES.

In procuring and arranging the specimens in the Reptile House our plan has not been limited to the mere exhibition of a collection provided with labels giving popular and technical name and the *habitat*. Reptiles are so little known that such a course would result in the mere display—attended with

little significance—of many apparently unassuming yet most important species. To produce an arrangement at once appealing to teachers and students, and at the same time comprehensive to the more hurried visitor, it is necessary to provide labels on which the more important facts are concisely stated, popularized charts of classification, colored maps showing distribution, photographs of the structure and certain cage arrangements of the specimens to conform with their respective habits. All these matters have been studied and tried, with very successful results. In consequence the Reptile House has become a centre for the observation and study of a class of creatures previously little known.

The labels have received the most detailed study. Indeed, they are as important as the specimens themselves, for a snake or lizard without a label is of little educational value. Even the technical scientist, who may immediately recognize a species, finds the example of no value unless the locality of its capture is known. The greater number of our specimens are provided with *descriptive* labels. Those provided with more concise *data* are grouped under one general description, and enough facts are displayed upon the labels in the Reptile House to fill a fair-sized book. Thus the way is paved for the teachers and their pupils to study the collection. In combination with the labels the charts, as mentioned, greatly facilitate in comprehending the scope of the subject.

To present the technical phases of classification in a popular way is a rather difficult proposition; but an attempt has been made in connection with the most striking groups—those of economic value, or of species dangerous to man. In constructing these charts it has been found necessary to create many appropriate popular names. Our idea has been with the labels and the charts to thoroughly simplify the subject, in fact to render plainly the valuable works of technical science which can be appreciated only by the specialist. In line with our views concerning the value of striking and concise facts displayed in connection with the exhibition of specimens, we have followed the scheme of coloring maps, showing the distribution of certain species, important groups or *genera*. As fair examples of what may be done in this way are the maps showing the distribution of the poisonous snakes of the New and the Old World.

The proverbial aversion for reptiles still remains strong and wholly unreasonable, though in our contact with the visiting public we note a decided awakening of unbiassed interest. There was a time, six years ago, when our visitors appeared to look upon the Reptile House as a great curiosity and to pass the varied series of scaly forms with considerable disgust. If the brilliant colors or the iridescent glow of one of the snakes excited special attention, the idea expressed was to the effect that

Nature had been strangely lavish in providing so "horrible" a creature with such striking hues. Of queries there were innumerable ones, relating to all sorts of sensational habits attributed to reptiles.

These conditions have been decidedly reversed, and we may credit the awakened desire for facts about the cold-blooded creatures to our methods of exhibiting the collection. A great number of school-children visit the Reptile House in classes with their teachers, and from the visiting public we note the greater number of questions to be prompted by a sympathetic interest. Everything possible has been done to assist the classes. Skeleton heads of harmless and poisonous snakes and a series of dissections have been prepared, which greatly help the teacher. But the most surprising part of this class work consists of what would have been considered, a few years ago, as quite a dreadful performance. This consists of the actual handling of various harmless snakes by the young students. We have classes coming to the Park in which young girls of fourteen or fifteen years think but little of passing from one to another a six-foot King Snake, and minutely examining the creature's glittering scales, the symmetrical arrangement of the head plates, the playing of the forked tongue and other serpentine characteristics. Imagine such a performance before the Reptile House was a reality! It would have started a newspaper story completely across the continent.

This is merely an example of how the aversion for snakes gives way with a real knowledge of the creature. Many times has the writer made a convert, and within five minutes. A little reasoning is necessary to explain away the time-worn fallacies about reptiles being slimy and clammy to the touch, that the tongue is not a "sting," nor is the snake naturally antagonistic to man. It is surprising to note the effect of this little knowledge, together with a subsequent demonstration as to a serpent's really docile actions when handled. To the astonishment of one who but a few moments before declared a snake the personification of all that is loathsome, comes a sudden fascinated interest, a realization that the creature is actually in wonderful contrast to every idea previously imagined. Thus the value of persistent efforts to enlighten upon a neglected subject.

A matter of considerable importance in the exhibition of living reptiles for educational purposes is the provision made in the cages of certain conditions calculated to induce the specimens to exhibit their respective *normal* habits. Take, for instance, some desert vipers, tree boas, tropical whip snakes and water snakes, and place all of the specimens in similar cages, with gravel and the almost proverbial awkward tree-trunk. Considered theoretically, all of the snakes have been suitably provided for, yet the conditions may be altogether

wrong to encourage the peculiar habits of each species. Place the vipers on an extremely fine sand to imitate that of their native deserts, and note how quickly they flatten their sides, shovelling the sand over the body until nothing but the flat head is exposed to view. Provide the tree boas with long, horizontal boughs, and each is soon coiled in an iridescent ball in one of the smaller crutches. Give the whip snakes a few brushy branches, and how wonderfully they interlace their slender bodies among the boughs, displaying remarkable feats of balancing. And as to the water snakes, a large tank effects an immediate transformation, for the slow-crawling serpents are at once changed to aquatic creatures of striking suppleness with an agility that makes them a terror to fishes. Such arrangements appeal just as strongly to the lizards and chelonians. Install many of the lizards in sandy yards and they display a speed in running that is amazing, *while many of them run on their powerful hind legs*. In an ordinary cage, similar actions would never be exhibited.

So to this, one of the many important considerations in the exhibition of reptiles, we have devoted considerable study. The result not alone excites sympathetic observation in the reptiles, but adds to the general attractive appearance of the building. Of one thing we must be careful, however, and that is to prevent the burrowing snakes and lizards altogether disappearing from view, yet furnishing them with conditions in a measure favoring the life to which they are adapted. The proposition is one of our puzzles, though we have managed to keep the delicate and beautiful coral snakes of the tropics on a thin layer of wood-pulp, dug from the heart of a decaying tree. Over the soft, damp medium the snake crawls about and appears fairly contented, while the greater part of its brilliantly ringed body is constantly in view.

As far as possible we have endeavored to group our specimens in a manner appealing to popular divisions. Thus, in immediate proximity are the various species of rattlesnakes—a well-known group of deadly North American serpents—and the different species of cobras, the most dangerous serpents of the Old World. Here one may note the difference between the characteristic thick-bodied, flat-headed Crotaline snakes and the venomous members of the *Colubridæ*, a family embracing the greater number of the harmless serpents and *some of the most deadly known species*, like the cobras and their allies, which differ from their harmless relations only by the possession of a pair of very short, fixed, poison-conducting fangs in the forward portion of the upper jaw. In their general outlines, unless the "hood" is spread the cobras look exactly like the slender-bodied, harmless serpents. The significance of this arrangement may be appreciated when it is explained that the most frequent query of

our visitors concerns the difference in configuration between the venomous and harmless snakes. It seems there is a persistent idea that the dangerous reptile always may be distinguished from the innocuous one by the stout body of the former. Our Elapine representatives (the cobras) are a surprising contrast to this common proverb.

A feature of particular interest is the grouping of the local reptiles. This installation is provided with large printed labels, containing liberal details. Of the fourteen species of serpents—two venomous—found in the vicinity of New York, each is on exhibition. The school-children take particular interest in this collection. It is a surprise to many to discover the fact that a beautifully colored and very dangerous serpent, the Copperhead Snake, may be encountered within a mile and a half of the residential section of upper Manhattan Island. And there are many little snakes found hereabouts that appear to be quite unknown to the greater portion of our visitors. Some of these are very secretive and, naturally, are seldom seen when wild. Among the local species exhibited are the Ribbon Snake, Garter Snake, Water Snake, Black Snake and others, illustrating how rich is the reptilian fauna of this vicinity.

Following this scheme of grouping the local reptiles, we have arranged a series of the batrachians, provided with the same type of descriptive labels. Here may be found the extremes in size among the frogs and toads, from huge bull-frogs, each weighing about a pound, to specimens of Pickering's Tree Toad, a mature example of which is barely larger than the nail of a man's forefinger. Combined with the frog exhibit is a series of jars containing the tadpoles of the respective species. All of these are from eggs that have been collected by the keepers of the Reptile Department during the early spring.

Among other reptiles exhibited collectively are the members of the *Boideæ*—the family of great constrictors, and dwarf ones as well. Here may be found the great Ular Sawa, or Regal Python, represented by specimens twenty feet long and each weighing over two hundred pounds; the Black-Tailed Python and the African Python, as well as such New World species as the Anaconda, the Boicucu, (*Boa constrictor*) and the Mexican Boa, these representing the largest of the *Boideæ*. But in adjoining cages are creatures showing how wrong is the prevailing idea that members of the boa and python family are necessarily gigantic. We find the slender Tree Boa, characterized by the heart-shaped head; the beautifully tinted species of *Ungalia*, no thicker than one's little finger, and finally, half buried in the sand, some diminutive, stumpy little snakes known as Sand Boas—all of these included among the *Boideæ*.

We believe that in our arrangement of the col-

lection in the Reptile House, the preparation of descriptive labels and the like, we have been met with a hearty interest on the part of an appreciative and intelligent public, and that a subject which has been little known, yet unjustly maligned, may now be regarded in actuality. For our labors we feel generously rewarded by the interest of teachers and in the increasing number of classes which visit the collection. Certain it is that this installation is second to no other in the Park in point of popularity, and we now feel convinced that our many visitors come to see reptiles as they really are, and not prompted by a morbid curiosity inspired by weird "snake stories." R. L. D.

THE POSITION OF THE NEW YORK ZOOLOGICAL SOCIETY

IN REFERENCE TO THE AUTOMATIC SHOTGUN

One of the objects of the incorporation of the Zoological Society was the protection of animal life; a large number of our members are earnestly interested in the preservation of both the mammals and the birds of North America; we have received some funds to be especially devoted to this purpose. The Executive Committee have no option, therefore, but to endeavor in every legitimate way by co-operation with other societies and through legislative influence to promote the cause of game preservation.

During the past year we have done our best to secure the passage of laws prohibiting the use of the automatic shotgun. This is not done through any ill-will toward the manufacturers, but from conviction that this gun is unsportsmanlike, that it is a most deadly and destructive weapon, that in the hands of market hunters especially it is certain to lead to the rapid destruction and elimination of many kinds of birds. We have been credibly informed that the sale of this gun has been particularly among hunters for the market. We have the authority of sportsmen who have experimented with it that it is a particularly destructive weapon. In our opinion it is to be classed with such means of destruction as the seining and dynamiting of streams, that it is a weapon which should not be used by any true sportsman, and that since it is commercially valuable to those who are hunting for purely money-making purposes regardless of the real interests of the country, strong legislative measures must be taken against it.

In January, 1906, bills were introduced through the agency of the Society in the legislatures of the States of New York, New Jersey, Ohio, Mississippi, and Rhode Island, and in the Congress of the United States, to prohibit the use of the automatic gun. The manufacturers of this gun were fully in-

formed of these bills, and have naturally exerted every effort to prevent their passage. The bills were regularly referred to the proper committees in the various legislative bodies and the manufacturers concentrated their principal efforts on the members of these committees. We do not know what arguments or methods were used, but the work was done so effectively that all the committees to whom these bills were referred refused to report them. When the Society learned what had been done, the committees were requested to report the bills even if unfavorable in order that the measure might be fought out on its merits in the various legislative bodies.

The manufacturers complain that we are attacking a legitimate industry, in which they have invested \$50,000. The Society cannot consider this a legitimate investment, and we shall continue to use every legitimate means in our power to prevent the further sale and distribution of this weapon.

It is alleged that the reason the manufacturers are so much interested in the gun is not only the sale of the gun itself, but in the large amount of ammunition it requires.

The New York Zoological Society, League of American Sportsmen, Audubon societies, and nature lovers outside of all these organizations will continue the agitation against this gun. It is simply a matter of thoroughly informing the people of the United States and through them bringing sufficient pressure to bear upon their representatives in the various legislatures and in Congress. The people of the United States do not desire the bird life destroyed; they stand for fair sport, and the arguments which are prompted by purely commercial motives and which have behind them solely pecuniary considerations have no weight with them. The preservation of our birds and mammals is like the preservation of the Yellowstone Park, the Falls of Niagara, and of the forests of the East and West. It is part of a contest between the interests of the few who consider nothing but their own pecuniary benefit, and the interests of the many who desire to continue to enjoy and to have their children enjoy these wonderful products of nature.

THE LIZARD AND TORTOISE YARDS.

AS explained on the editorial page of the current number of the BULLETIN, some reptiles, especially lizards, display little of their normal habits if confined in indoor cages. Thus we have made a great improvement in the Reptile Department in constructing a series of large outside yards for the lizards and tortoises. These yards are situated at the east end of the Reptile House. Each connects with an inside pen for use in cold or stormy weather. Each yard is covered with

several inches of coarse sand and contains a large concrete basin.

The largest of the yards is about twenty-five feet square and well exposed to the sun. It has been planted with cactus and bayonets, while in the centre a large dead cedar has been set up, this generously furnished with horizontal branches. This corral has been stocked with five species of iguanas; the Bahaman Iguana, (*Cyclura ballopha*); Turk's Island Iguana, (*Cyclura carinata*); Rhinoceros Iguana, (*Cyclura cornuta*); Spine-Tailed Iguana, (*Ctenosaura hemilopha*); Common Iguana, (*Iguana tuberculata*), and the variety *rhinolopha*, of the latter species. Besides these showy creatures are Mastigures from the Sahara Desert, three species of Monitor, and several large South American Tegus.

Most of the lizards mentioned have for a year or more been exhibited in the Reptile House. It was estimated that a sheet-iron overhang on the fence, which is a yard high, would keep the larger lizards from jumping—but in the exhibiting of the big iguanas out of doors, we have acquired considerable knowledge of habits. For the first week or two the lizards absorbed the undiluted sunshine, showed symptoms of appetites quite out of proportion to their indoor feeding, and grew stronger. Then they began evincing habits peculiar to them in a wild condition. The Spine-Tailed Iguanas surprised us by running about on their hind legs, and we find this practice to be common among many lizards. Most astonishing, however, were the leaping powers suddenly developed by the Bahaman and Rhinoceros Iguanas. These brutes desired further freedom. They began hurdling the fence, clearing the overhang without trouble. Luckily, when they were once outside they made no attempt to get away, but sprawled out for a sun bath on the grass. Whether the iguanas considered such gymnastics as mere diversions is hard to say, though certain it is we did not lose a single specimen. We discussed plans of constructing a higher overhang, a condition which would greatly detract from the attractive appearance of the yards. In the midst of such consultation, the lizards ceased their annoying manoeuvres of jumping the fence, though they ran about the yard as lively as ever. It is our hope that their awakened appetites may cause them to grow fat enough to refrain from their former exhibitions, and pending a trial as to their good behavior the fence is to stand as it is.

In the series of yards are two that are ten feet wide and fifteen feet deep. These are occupied by miscellaneous species of the smaller tortoises. In the larger yard on the other end of the series are the Giant Tortoises from the Galapagos and the Aldabra islands, as well as a number of fine tortoises brought from Abyssinia by the Society's representative.

R. L. D.



SPECIMENS OF GIANT TORTOISE, ABYSSINIAN TORTOISE AND HINGED-BACK TORTOISE.

THE COLLECTION OF AFRICAN REPTILES.

While the Reptile House has contained a good representative collection of the four orders of reptiles during the past six years, it is only recently that a characteristic series of African reptiles has been exhibited. It is next to impossible to procure the smaller and more interesting of the African lizards and snakes from the dealers, as the extensive journey invariably proves fatal. About the only African reptiles to be bought nowadays are specimens of the Rock Python, (*Python sebae*), imported by all the larger dealers for the shows. This species is always on exhibition in the Reptile House. Thus, under the conditions described, the building was utterly lacking in specimens from the Dark Continent, until the New York Zoological Society's representative, Dr. Cecil French, journeyed into Abyssinia and secured for the Society a fine lot of tortoises, lizards and snakes. These filled a series of cages and happily are quite representative, among them being the typical stout-bodied vipers, the slender cobra, geckos with adhesive digits, desert lizards that dig with a shovel-like snout, and the swift-running species of arid places, while the tortoises were valuable additions to the colony occupying the new Tortoise Yards and Corrals.

Among the African tortoises we find the largest species of *Testudo* outside the group of giant

chelonians inhabiting the Galapagos and the Aldabra Islands. Many of the African reptiles are strikingly marked. Some are grotesque in the high, dome-like development of the shell or the rough shields, which rise in a series of concentric, step-like processes.

The most remarkable of our African chelonians is the Hinge-Backed Tortoise, (*Cinixys erosa*), a species of rather small size. Here we find in the hinged formation of the shell, a development similar to the American Box Tortoises, (*Cistudo*), with the curious difference that Nature's handiwork is exactly reversed. Instead of the *plastron* being hinged, as is the case with *Cistudo*, the African reptile has the posterior half of the *upper shell* connected by a cartilaginous hinge. Beneath the bony covering are muscles of wonderful power. In time of danger this attachment is pulled downward tightly against the *plastron* and held with such strength that a strong man's unaided hands cannot budge it. Compared with other African tortoises the present species is altogether unique. The shell is rather flattened, while the marginal shields present a decidedly serrated border and flare sharply upward. Our specimens are very timid and seldom show more than the snout and eyes when in the presence of an observer. If handled they close down the hinged part of the carapace, draw in the head, then fold the bony-plated forearms closely together. Nor do they recover from the fright for several

hours' time. When obtaining his photograph of the species, Mr. Sanborn was cautioned not to touch or even step heavily near his very sensitive subjects, as a half-day's wait would be the inevitable result.

In direct contrast to the former species is the Leopard Tortoise, (*Testudo pardalis*), a dozen fine examples of which were procured by Dr. French in Abyssinia. It grows to a weight of seventy-five pounds. The shell is exceedingly high—dome-like—while the sides are nearly vertical; in fact the actual shape of this creature's shell is like the cranial portion of a high-built human skull. The popular name is not only significant, but decidedly appropriate, as the upper shell is straw color, thickly and vividly blotched with black, imparting an immediate suggestion of the leopard's pelt. The largest specimen on exhibition compares favorably in size with a 100-pound example of *Testudo nigrita*—one of the giant tortoises from the Galapagos Islands.

Owing to the fact that we have received a number of specimens of *Testudo pardalis* from Abyssinia, the writer is able to greatly enlarge the limits of the *habitat*. As heretofore known, Boulenger gives the distribution as "Africa, south of the equator," recording the species from East Central Africa, Algoa Bay and South Africa. From such regions our records are far removed. Doubtless, the species is generally distributed, at least as far north as Abyssinia. Dr. French informed me that he found it generally common in rather dry, farming country. He several times observed large individuals stalking across the fields. One example brought to him was so large it required four men to readily carry it.

Another of the African tortoises exhibited is the Iberian Tortoise, (*Testudo ibera*), a small species inhabiting the northwest portion of the continent, as well as Syria, Asia Minor, Transcaucasia and Persia. Its olive shell, blotched on the margins of the shields with black, causes it to closely resemble the nearly allied European Tortoise, (*Testudo graeca*), also represented in the collection. In a temperature of about 90° F., the latter two species are so active they may be justly described as fairly *running* over the ground in search of food or in amorous play. Many tortoises are just as active, and the assertion that such chelonians are naturally sluggish, even "studied" in their movements, comes from observation made with reptiles in a far lower temperature than that to which they are accustomed.

The spacious Tortoise Yards are now completed and the numerous specimens revel on the dry, sun-warmed sand. These quarters are shared with the large tropical lizards, and the consequent exhibit is one of the most interesting phases of the reptile collection. Among the African lizards that

will share these new yards are a number of large Mastigures, or Spine-Tailed Lizards, (*Uromastix spinipes*). They are the largest of their kind that have ever been exhibited in the Reptile House, and their structure is quite remarkable, the tails having the appearance of the most cruelly devised war-clubs. This, and several allied species, inhabit the deserts of northern Africa and Arabia.

The Spine-Tailed Lizards run with considerable activity, but their gait is tardy in comparison with many of the desert forms. Just why they should be provided with the extraordinary bristly tail, with stout spines arranged in regular, ringed formation, is a puzzle. Possibly the tail is useful in blocking the burrow of this creature, for no enemy could pass the formidable organ with impunity; besides the lizard has the power to rotate its entire body when attacked, or deal powerful blows with the tail.

Of all lizards, Mastigures are the most difficult to maintain in good health. They have the most capricious appetites. It appears that they are chiefly herbivorous, yet it is impossible to satisfy them with lettuce leaves, celery, clover and other succulent greens. As the food is thrown to them, several individuals will rush for it, take a single mouthful, swallow the same, then deliberately walk away. Occasional examples will eat mealworms. When the pan of insect food is placed near the lizards, there is the same rush of several interested members. A few of the mealworms are eaten; then the lizards stalk off after having eaten enough to nourish a creature but one-tenth their size. From all appearances they are continually hunting for food native of their deserts, that we are neither able to produce nor imitate, and in the meantime they are starving. Everything that has ever been eaten by a lizard in the Reptile House has been offered these strange brutes. They present a curious problem, but we hope to solve it.

Of the other African lizards, the Geckos attract the immediate interest of visitors. To the astonishment of the observer, one of these thick-bodied, warty-looking lizards, weighing as much as a half-grown rat, will suddenly rush up the smooth wall of the King Cobra's cage—in which they live without molestation—then, so unexpectedly as to make the onlooker gasp with amazement, the reptile jumps to the ceiling and runs across it like a gigantic fly. Such actions of heavy-bodied lizards appear quite mysterious until one understands that the geckos have a disc-like sucker on each toe. At night, when these reptiles are particularly active, they run all over the big glass front of the cage. The species exhibited is known as *Tarentula annularis*. It is a native of Abyssinia, Egypt and Arabia, and characterized by four cottony-white spots on the shoulders. The food consists of other species of small lizards, as well as insects.



THE AFRICAN GECKO, (*TARENTALA ANNULARIS*).

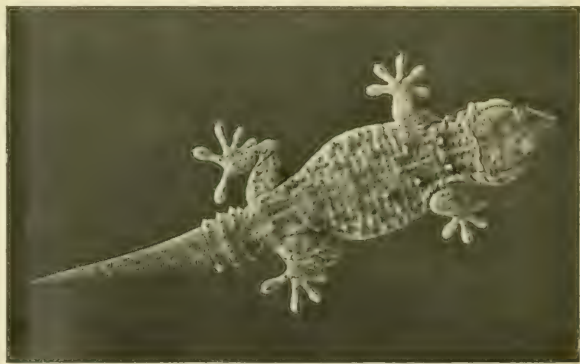
Showing the disk-like suckers on the toes, with which it clings to flat surfaces.

As a remarkable instance of adaptation to a life on fine, desert sands, we may select an African Skink, (*Scincus officinalis*), several specimens of which are on exhibition. The snout is flattened laterally to such a degree that it forms an excellent scoop, while the toes are so wide and thin they look almost like feathers. Thus these animals can walk over fine sand without the feet sinking, or, if they wish to burrow, they employ the scoop-like snout. In addition to them the collection possesses a closely allied, thin, snake-like species, provided with four limbs; but the latter are ludicrously small. As the creature progresses it folds the limbs against the side of the body and glides like a serpent. When annoyed it literally swims into the sand, the wedge-shaped snout greatly assisting in the process. Other African lizards on exhibition represent the familiar *Lacertide* and *Agamidae*. Many of our specimens are members of the desert fauna and consequently of a pale reddish-brown or yellowish hue.

It is among our African serpents that we may possibly find the most interesting specimens. With these the Reptile House exhibits two snakes of historical renown—the Egyptian Cobra, (*Naja haje*) and the Horned Viper, (*Vipera cerastes*). It has long been a much-discussed question as to which of these two deadly creatures was the famous "Asp" figuring in the

romantic history of Cleopatra. In some paintings depicting that historic event the Egyptian queen is shown with the Cobra, its spread hood causing the reptile to form an admirable accessory to the painter's inspiration; but in other works of art the Viper is figured as the means of destruction. Certain it is that either of the species is sufficiently venomous to cause speedy death. If Cleopatra had known the respective actions of the venoms of these snakes, she would have selected the Cobra, as the bite of that species usually produces a state of coma, during which the vital forces gradually diminish.

The Egyptian Cobra differs from its spectacular Indian relative, the Spectacled Cobra, by an absence of markings on the "hood." It is a dull, brown snake, sometimes dotted with yellow. Of the several dozen examples observed by the writer, all were uniformly vicious and marvellously quick in their motions. In striking, they utter a sharp hiss, like a sneeze, and after a frenzied display of rage a snake will actually fling its body into a dark corner of the cage, there to lie partially coiled, hissing sonorously with each exhalation of the breath. After years in captivity they are just as wild as when captured. It is a singular fact that they are among the most hardy of serpents in captivity if kept in a steady temperature, while they are unable



ANOTHER VIEW OF THE AFRICAN GECKO,
(*TARENTALA ANNULARIS*).

stand even a slight degree of cold. In several shipments of African reptiles received during the winter, all of the cobras, in every instance, were found to be dead, while the vipers and other snakes that live on the hot sands of the deserts were in good condition, though necessarily a little benumbed from exposure. Yet the vipers that so readily survive shipment into this country during the winter months are very delicate as captives. They feed well enough for a few months, then die of various ailments—enteritis, diseases of the lungs or suppurative disorders of the mouth-parts.

The Horned Viper, (*Vipera cerastes*) is represented in the collection by eight adult specimens. These reptiles will not feed unless kept very warm. They continually lie on the perforated copper sheathing covering the heating pipes in the front of their cages. Like all of the desert vipers they are always seeking to throw sand over their backs, thus hiding their bodies. In shovelling sand the reptile flattens the body to such an extent that the lower edge acts as a scoop, then, by a remarkable series of wave-like motions travelling the length of the body on either side, the snake sinks into the sand or works it over the back. To provide for semi-burrowing life the eyes are placed near the top of the head, as with some water snakes; but this character is more pronounced with the Common Sand Viper, (*Vipera vipera*), of northern Africa. A flourishing colony is living in the Park. The members alternately endeavor to shovel sand or move rapidly about the cage in a bewildering series



HORNED VIPER, (*VIPERA CERASTES*), AND SAND VIPER, (*VIPERA VIPERA*).

of loops, the snake not actually crawling, but throwing out lateral loops one after another, in a fashion that imparts a rapid, *walking* motion. The arrival of these vipers was attended with a great surprise to the writer, who momentarily imagined he had discovered a "new species."

When the vipers arrived at the Park specimens of the Horned species, (*Vipera cerastes*) were included among a greater number of the commoner snake (*Vipera vipera*). All of the horned specimens were placed in a cage by themselves. The examples of *Vipera vipera* were put into an adjoining cage. Upon looking over the former lot the writer was surprised to discover specimens with horns back of the eye, instead of directly over the organ, while the entire scalation of these specimens was suspiciously like that of the common sand viper. A closer inspection showed a remarkable condition. The clever Arab "fakirs" had forced two quills of the desert hedgehog (*Erinaceus auritus*) through the roof of the mouth and out



HINGED-BACK TORTOISE, (*CINIXYS EROSA*).

Showing the carapace (upper shell), and the plastron (lower shell)



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AN AFRICAN PIGMY

ON September 9, a genuine African pigmy, belonging to the sub-race commonly miscalled "the dwarfs," was employed in the Zoological Park. His name is Ota Benga, and he was brought to America by Mr. Samuel P. Verner, an American explorer and collector. His height is four feet eleven inches, he is about twenty-three years old, weighs 103 pounds, and has been married twice. His first wife was stolen by a tribe of hostile savages, and his second wife died from the bite of a poisonous snake.

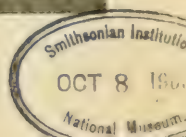
Ota Benga is a well-developed little man, with a good head, bright eyes and a pleasing countenance. He is not hairy, and is not cov-

ered by the "downy fell" described by some explorers. His skin is as free from hair as that of a typical European. He has much manual skill, and is quite expert in the making of hammocks and nets. He is happiest when at work, making something with his hands.

In 1904 he was found by Mr. Verner on one of the southern tributaries of the Congo, a captive in the hands of a tribe of cannibalistic savages known as the Baschilde. The exact locality was the confluence of the Kasai and Sankmir Rivers, Upper Congo. Knowing that this tribe sometimes sacrifices their slaves, and sometimes eats them, Mr. Verner,



AFRICAN PIGMY "OTA BENG."



prompted solely by the instincts of humanity, ransomed Ota Benga, and attempted to convey him back to his own country. Mr. Verner was specially interested in the pigmies, having recently returned to their homes on the Kasai River the half dozen men and women of that race who were brought to this country by him for exhibition in the Department of Anthropology at the St. Louis exposition.

The attempt to return Ota Benga to his home failed, because of insurmountable obstacles. The pigmy then begged to accompany Mr. Verner to America, and even threatened to drown himself otherwise. Finally, the explorer decided to give him the desired opportunity.

The tribe to which this little man belongs is known as the Bachichi, a word which means "bushmen." The Bachichi are true pigmies,

but they are not dwarfs. They are the bantams of the African race. They are found in scattered communities in many portions of the great equatorial forest, and have been met and described, under various names, by Du Chaillu, Stanley, Schweinfurth, Wellé, and other explorers.

Ota Benga is black—though not what is known as "coal black"—beardless, and very well formed. He knows about 100 English words, but it is not Mr. Verner's purpose to educate him beyond the necessities of his own sphere. In a short time he will be back again with his own people. Just how long he will remain at the Zoological Park, no one can say. He is accompanied by a fine young chimpanzee which Mr. Verner has temporarily deposited in the ape collection at the Primate's House.

W. T. H.



GOULD'S MONITOR.



RHINOCEROS IGUANA.

Representing two of the larger species of lizards in the collection.

THE COLLECTION OF LIZARDS

LOOKED at collectively, the series of lizards in and about the Reptile House is quite representative and elaborate. Species of the following families are now represented in the collection: The *Iguanidae*, *Agamidae*, *Anguidae*, *Scincidae*, *Varanidae*, *Teiidae*, *Lacertidae* and *Chameleontidae*. Among the members of eight families of lizards the variability in form and habits is great. Thus the specimens are exhibited under various conditions, and many, the writer is sorry to say, are not always to be seen by visitors, owing to their secretive habits.

It was with the completion of the east end of the Reptile House, which forms a glass court, that suitable quarters were furnished the diurnal lacertilians. Here there is an abundance of diffused sunlight, a number of perfectly dry, sanded paddocks and connecting yards outside that are bathed in sunshine for the greater part of the day.

Our success in maintaining the collection of this installation has indeed been most gratifying. And it must also be remarked that the outside lizard and tortoise yards, judging from the interest displayed by visitors, are to be rated among the favorite features of the Park. It is in these yards that we have been able to

make a number of important observations. We find that the curious habit of running on the hind legs, previously described as existing with but one or two Old World lizards, is actually a common habit among the members of the New World *Iguanidae* and the Old World *Agamidae* as well. It is a habit almost invariably confined to strictly terrestrial lizards, with elongated, powerful hind legs, like the Mexican Basilisks, (*Basiliscus*), the Ground Iguanas, (*Ctenosaura*), or the familiar Colored Lizard, (*Crotaphytus*), of the western United States. This kangaroo-like position is always assumed by such species when running very fast. The reason for this habit remaining in obscurity so long may doubtless be explained by the lack of proper facilities of many students for the study of their living specimens. Kept in the proverbial small cage, or terrarium, these lizards give not a hint of their singular gait. It seems reasonable to suppose that this is an ancestral trait passed down from the gigantic lacertilians of the past, many of which stalked about on enormously developed hind legs while browsing from overhead branches.

Kept in suitable quarters, where they may exercise and develop a normal appetite, our various species of iguanas have displayed feeding habits quite different in contrast to the prevailing idea that they are wholly herbivorous. We find, in fact, that the larger, terrestrial species, such as the Rhinoceros Iguana, (*Cyclura cornuta*), and the Bahama Iguana, (*C. baelocephala*), are largely carnivorous, rushing upon small mammals with the same ferocity as the strictly carnivorous Monitors, (*Varanus*). Besides, these iguanas will eat birds, eggs and the larger grubs of insects. Even the persistently arboreal iguanas are flesh-eaters to a considerable extent.

In our collection of lizards, the student may note the enormous variability of form among lacertilians. In this order, as among many others of both cold and warm-blooded creatures, one phase of evolution has been the marked degeneration of species that have gradually adopted secretive or burrowing habits. We find among our lizards species that are entirely devoid of external limbs, that progress by lateral undulations, like a snake. An example of this kind is the American "Glass Snake," a member of the *Anguillidae*. The make-up is exactly like a serpent, but the presence of eye-lids and ear-openings should denote lacertine relationship even to the novice. Compare this snake-like creature with one of the big monitors—a giant among lizards—

and note the great difference in structure and bulk. Eight feet long, with powerful limbs and claws as long as those of a leopard, the monitor is fleet, strong and audacious enough to leap upon a fawn and tear at its throat until the victim is overpowered. And between these extremes, we have on exhibition the great series of intermediate forms, some so grotesque as to appear like much overdrawn caricatures of disordered dreams, others so exquisitely beautiful in form and coloration, that correct delineation by an artist might be viewed with derision as quite impossible products of Nature.

One of the most remarkable of our lizards is the Mexican Basilisk, (*Basiliscus vittatus*), a wonderfully fleet creature with a high, stiff comb on the rear part of the head, and a greatly elongated tail and hind legs almost as much developed as those of a frog. In some works of Natural History, this species has been described as altogether arboreal. Its habits are actually quite the reverse. Mr. Gustav Sabille, who captured fourteen specimens near the East Coast of Mexico, informs the writer that he found these lizards in quite dry, sandy places, darting about at bewildering speed in company with a large species of *Ameciva*. Mr. Sabille explains that all of the specimens of the Basilisk observed by him ran on their hind legs when pursued. They were so fleet of foot as to appear like a mere streak when running. They appeared as if convinced of their ability to easily evade capture, for instead of darting straight away, the course of most specimens was in a semi-circle, and during the heat of mid-day, the collector found it impossible to catch them owing to this dodging. Late in the afternoon they could be chased into thickets, thence cautiously stalked with some success. The antics of these lizards after arrival in the Park were quite in accordance with Mr. Sabille's description. They are mostly insectivorous, but small flowers are also sometimes eaten. Owing to the needlelike development of the claws, we are compelled to keep them indoors, as several specimens ran up the brickwork on the side of the Reptile House, hurled themselves backward, and escaped over the walls of the corral.

The large yard devoted to the Iguanas has taken on quite a tropical aspect since stocking with a fine series of the large species. A bright sunshine brings all of the specimens from indoors. Sprawled about the yard in odd positions, may be seen the big Rhinoceros and the Bahama Iguanas, of dingy brown

hues, the skin coarsely wrinkled on the sides, the head massive, with powerful jaws; one species with three horn-like protuberances on the snout, the other with fiery red eye-balls. If these reptiles were eight or ten times larger, we would have veritable reproductions of the hideous-looking lizards of by-gone ages. Scattered about the corral are iguanas of other species, among them the Ring-tailed Iguana, (*Cyclura carinata*), a little known species

from Turk's Island, and the burly Mexican Iguana, or Spine-tailed Iguana, (*Ctenosaura hemilopha*). In the center of the corral stands a big cedar trunk, generously supplied with outstretched, horizontal boughs. On this may be seen a thriving colony of an arboreal species, the South American Iguana, (*Iguana tuberculata*), a lizard that is regarded in most portions of its *habitat* as excellent food, and sold in large numbers in the market.



From a drawing by Henry J. Blake.

A NEW SPECIES OF SEA-HORSE.

DESCRIPTION OF A NEW SPECIES OF SEA-HORSE FROM BERMUDA

By C. H. TOWNSEND AND THOMAS BARBOUR

IN July, 1906, there was published at the Field Columbian Museum, a catalogue of the fishes of Bermuda, by Dr. Tarleton Bean. In this paper are enumerated 261 species, twelve of which are described as new to science.



A 400 POUND JEWFISH.

Professor Trevor Kincaid of the University of Washington, who visited the Bermudas in July, has left with us for examination, a few fishes obtained by himself and others taken by persons connected with the Bermuda Biological Station. One of these fishes proves to be a new species of sea-horse, another, (*Auchenopterus fajardo*), is new to the fauna of Bermuda. This specimen was taken within

a concretion dredged on the Challenger Banks by Mr. Owen Bryant. The latter has hitherto been known from a single specimen taken at Fajardo, Porto Rico, in 1899. Another addition to the fauna of Bermuda is shown in the accompanying photograph, made by Mr. Walter L. Beasley, in Bermuda, May, 1905, picturing a 400-pound specimen of the Black Jewfish, (*Garrupa nigrita*). It is one of the largest of the food-fishes. The sea-horse may be described as follows:

HIPPOCAMPUS KINCAIDI. Sp. nov.

Length of head equal to body; eye two and one-half in snout and six in head; height of supraorbital spines equal to eye, with filaments slightly longer; height of coronet equal to eye, with filaments twice as long, anterior part with one filament, posterior two. Dorsal filaments on first, third, fifth and eighth body-rings, and third, sixth, ninth, twelfth and fifteenth tail-rings. Spines bearing filaments more prominent than those on other rings. Length of dorsal filaments about two-thirds of snout. Short filaments on lower surface of snout and on anterior joints of four rings of body above anal fin. D. 19, P. 15, A. 4. Dorsal on 3 + 1 rings. Rings 12 + 31? Rings of upper body somewhat confused. Color in alcohol: Lusterless white with a slight dusky suffusion. Specimen one and one-half inches long. Bermudas, July, 1906. Type in collection, Museum Comparative Zoology, Cambridge, Mass. Named for Professor Trevor Kincaid, who has made most interesting collections at Bermuda, in many branches of zoology.

Soon after the summer closing of the New York Hippodrome in June, Captain J. G. Woodward deposited at the Aquarium, temporarily, two of his trained California sea-lions. These remarkably intelligent animals, which have attracted so much attention at the Hippodrome, are very welcome guests at the Aquarium. These animal *stars* will be greatly missed at the Aquarium when the time comes for them to go before the foot-lights again. To the general public they are, perhaps, the most interesting objects in the building.

C. H. T.

The Aquarium has at the present time a four-hundred-pound Loggerhead turtle, taken on June 20 in a pound net at Belford, N. J., in New York Bay. Its length from beak to tip of tail is five feet and nine inches. The top shell is three feet and ten inches long.

C. H. T.

HOW SEALS ARE TRAINED

By C. H. TOWNSEND

(This article is based on an interview with Capt. J. G. Woodward.)

AMONG the attractions offered to the public at the New York Hippodrome during the past season none proved of more general interest than the trained seals. Their performances were as charming as they were wonderful. The animals exhibited were of two kinds: the rather small spotted or harbor seals and the decidedly larger California sea-lions. The former have short hair-covered flippers and are not capable of much activity on land, while the latter have long, naked flippers on which they can readily stand, and are among the most active of the seal tribe when out of water. All sea-lions are seals, although all seals are not sea-lions. The seal family is a large one, including the huge walrus of the Arctic, the elephant seal, the sea-lion, the fur-seal and many other kinds which are just seals.

Under the direction of their trainer, Captain Woodward, seals and sea-lions perform difficult and interesting feats. Among their accomplishments are the balancing of large air-filled rubber balls, silk hats, billiard-cues, lighted torches and other objects on their noses. They readily pass balanced objects from one to another without dropping them. They can produce sounds in concert on various musical instruments, such as horns, banjos, drums and cymbals. Half a dozen clown-caps tossed in rapid succession are deftly caught by one animal on its nose, each pointed cap-crown being the peg on which to catch the next, until all are caught and stacked on the sharp nose of a single sea-lion. Misses seldom occur.

The animals appear on the stage in more or less orderly procession, considering the fact that they are out of their natural element, and occupy the positions assigned them directly in the glare of the foot-lights. They bark in chorus or keep silent as directed, and remain on their pedestals until called forward. In view of the fact that seals are aquatic animals, without real legs to stand upon, their performances as a whole may be considered a triumph of the art of training animals.

When the season at the Hippodrome closed and the troupe of seals went on the road, two of the seven sea-lion *stars* were left at the Aquarium for safe keeping.



SEA-LIONS PASSING HATS FROM ONE TO THE OTHER.

When Captain Woodward called at the director's office he was good enough to explain the methods by which he secured his remarkable results in seal-training.

Seals have plenty of brain capacity, and Captain Woodward is of the opinion that they can be still more highly trained.

When questioned as to his methods of control he said that good results could be secured only through a constant *appeal to the appetite* of the animal. Each success it scores in performing is at once rewarded with a piece of fish. In teaching, for instance, the balancing and bouncing of the large air-filled ball, the latter is first thrown at the seal's head with the idea of inducing it to toss it up with the nose. This is tried repeatedly until the animal happens *by accident* to do what the trainer wishes, when it is promptly fed. The efforts to make the creature understand what is wanted are continued patiently until the ideas of ball-play and food are associated in its mind. After that progress is more rapid. Presently it dawns on the animal that it can get food by

tossing the ball in the air. It gets constant encouragement from the trainer in the way of assistance in placing the ball and an encouraging tone of voice is maintained.

While seals can be restrained or made to keep their places by judicious scolding or a little threatening with the switch, an appeal to the appetite of the animal is the main reliance in the teaching of tricks.

It requires about three months' steady training to make seals comprehend what is wanted of them, and a year's training is necessary before the tricks can be performed in the best manner. The period of training varies according to the ability of the individual, some animals being much brighter than others. Thorough familiarity with their parts is necessary before the animals can do good stage-work. There are usually two or three seal "understudies" that accompany the troupe out upon the stage and seat themselves on pedestals with which they are familiar. After a time these mere onlookers become restless and evince a desire to do something. They are

brought forward occasionally as capacity to perform is developed. Only the simplest tricks are taught at first. The seals are trained, however, without being entirely tamed, as the trainer desires that they shall remain active and spirited; the best results can not be secured with an animal that has been made timid or bad-tempered. The temper of even a well-trained seal may continue a trifle uncertain, and even the trainer himself is liable to be bitten if he gets too close. Its instinct to defend itself by biting remains strong. While trained seals go through their work in a happy style, clearly entering into the spirit of it, all performers must be stimulated by frequent feeding. The piece of fish in the trainer's hand thus becomes the idea behind it all.

Sea-lions have a lively curiosity. On the stage and in their quarters they are full of fun and mischief. When allowed liberty they pry about the premises, overturning various articles, playing with the rubber hose and engaging in general romping after the fashion of dogs.

Private rehearsals are not necessary with trained seals when performances are being given daily in public.

The appetite of the seal is enormous. Captain Woodward supplies his nine animals with about one hundred and fifty pounds of fish daily, which is cleaned and dressed before being given to them. One light meal is, of course, served on the stage as a stimulus to good work.

When questioned as to the effect of training on the life of the animals, Captain Woodward maintained that trained animals live decidedly longer in captivity than those kept without training. One of his sea-lions has been on duty for nine years, and, judging from its size when captured, it is now thirteen years old. Several of them have been at work for six or seven years. The small harbor-seals when trained, live apparently as long as the sea-lions. This argument is entirely reasonable. The necessity for activity in captive seals is fully appreciated at the Aquarium, where several naturally lively individuals lived many years, while the lazy, sleepy kinds did not last long.

The mental capacity of the harbor-seal is apparently as good as that of the sea-lion, but its limited activity out of water naturally restricts its accomplishments under the hand of the trainer.

There are at the present time only four or five bands of trained seals and sea-lions in

existence, several of these having been educated by Captain Woodward and afterward sold to other exhibitors.

Captain Woodward's headquarters are at the entrance of Shoreham Harbor, near Brighton, England, where there is a large fenced enclosure which is flooded each day by the tide. The animals are provided with a resting place, and a shed which they use at night. Their surroundings at Shoreham Harbor are made as natural and comfortable for them as possible.

With a view to testing the memories of his troupe, Captain Woodward has occasionally allowed sea-lions a three months' rest in the freedom of their enclosure, and then given a satisfactory public performance without a rehearsal.

It has just been announced that he has sold his last troupe of seals and will abandon his profession of animal training to undertake the work of an evangelist in London, a work in which he feels it his duty to engage.

On July 31 the Aquarium received an unusually large specimen of the Manatee or Seacow, (*Manatus latirostris*).

It was presented by Mr. A. W. Dimock, of Marco, Fla., and was transported free of charge by the Florida East Coast Railway Company and the Clyde Steamship Company, through the courtesy of General Traffic Manager Beckwith, of St. Augustine, and General Manager Eger, of New York.

The animal had unfortunately been injured, probably previous to capture, and died eight days after it arrived at the Aquarium. It was turned over to the American Museum of Natural History in Mr. Dimock's name.

An autopsy showed that its death was due to general septicemia. There were three large pus-cavities in the body. Otherwise the animal was in good condition except for abrasions of the skin received during transportation.

The animal was apparently of considerable age. It weighed nine hundred and ten pounds and was ten feet four inches long. It was not observed to take food at any time while in the Aquarium. Mr. Dimock then presented another manatee, six feet long, which at the present time is doing well.

Since the last issue of the BULLETIN the Aquarium received its usual summer collection of fishes from the Bermuda Islands, including many of the brilliantly colored species peculiar to these tropical waters. The collection contained two large specimens of the green moray.

C. H. T.

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THE SUCCESS OF THE NEW BIRD HOUSE

One hundred and fifty thousand dollars is a good deal to risk in an experiment and yet that was what was done in building the new Bird House—an experiment, however, backed up by so much experience and judgment and careful planning on the part of the Director that every favorable prophecy has come true.*

As is ever the case with innovations, there were people both here and abroad who predicted doleful failure. One Englishman called the house a "grotesque New York experiment." After a year of occupancy, when every novel detail had been tried out and none found wanting, the writer made answer to these doubts and vague prophecies of evil in the "Avicultural Magazine," of England. So many of the questions are of interest to the members of the Zoological Society that a brief outline of some of them is well worthy of record.

Our English critic spoke truer than he knew when he abused the New York climate. The fluctuations are beyond all belief, and, theoretically, all alien birds should promptly succumb to its severity. At present there are not far from one thousand healthy, happy birds sheltered by the "grotesque experiment"—from a flock of tiny grassquits to great concave-casqued hornbills, and all have positively refused to be influenced by the critic's logic. The storms of winter have howled outside and found the building invincible, guarded night and day by the automatic thermostats, regulating the temperature to a degree; the heat of summer has beat down and only encouraged the birds to greater activity and song. This latter objection was considered long before the building was completed, and it was never the expectation that the roof should remain as it was throughout the summer. When the direction and force of the rays of the summer sun was gauged, a thin skim of white was laid on over certain panes of glass roof, thus allowing the tenants of each cage to enjoy sunshine or subdued shadow as they preferred. Even this painting of the roof will not be necessary when the plants have had several years to grow; for, the critic notwithstanding, the flora of the Bird House is a decided success.

The mice wrought havoc at first, but we pitted brains of the genus *Homo* against those of the genus *Mus*, and *Homo* has won! The mice gnawed the roots of the palms, so we protected them with wire; they made nests in the heart of the frond stems, so we bound a mouse's-reach of the trunk with impassable smooth metal. The vermin destroyed the vines until the boxes were isolated on brackets and the bricks were varnished smooth. Defeated here, they held on for a time in the cages themselves, until now a systematic relay of traps, terrier dogs and sparrow hawks have reduced their number to a mere remnant of what they once were. The fox terriers were long since introduced to all the birds, and create hardly a ripple of excitement when lifted into a cage and told to "dig 'em out." The tropical sparrow hawks learned at once that there was good hunting by moonlight, and when moved to a vacant cage next to a flock of weavers, they feasted high on the mice running through the cage. Of late their supply has dwindled almost to nothing. All holes leading to the cellar were stopped up and—thus ended the mouse war!

Among the plants now flourishing in the building are sago palms, illawarra and areca

*See Z. S. Bulletin No. 18, July, 1905.

palms, cinnamon, lemon and orange trees (the latter in full blossom), Norfolk Island pine, creeping fig, shingle plant, bougainvillea, Chinese yam, alameda, Boston ferns, clereodendron, and other vines. Cabbage palms stretch wide their feathery fronds, and the wide-spreading bamboo stalks have flourished so that they now touch the roof. Frequent judicious and scientific spraying has completely overcome the dust objection; so instead of a few "hanging-baskets and hardy evergreen bushes," which must be replaced "once a week or every fortnight," we have foliage growing so rapidly and well that it has been necessary to cut away more than one leafy branch to clear the front of a cage.

So closely did we gauge the groups which would here find housing, that every group quoted in my paper in the July, 1905, BULLETIN, is now represented by from one to one hundred and fifty individuals, with the sole exception of the bower-birds and sandgrouse, of which we have not as yet been able to secure specimens.

Ten partitions have been removed from cages in various parts of the building, their removal throwing two or three cages together, and further attesting the value of flight cages of moderate size. In fact, these have proved successful in every way. With all the constant moving about of birds, and the frequent disturbances incident upon the first year in a new building, a number of birds have nested and raised young—doves, pigeons, parakeets and finches.

The critic can hardly have seen parrots in a wild state if he says they seldom fly for the pure love of flying. My lasting impression of macaws, parrots and parakeets in Mexico, is of birds constantly on the wing, making high, overhead, direct flights, or swinging in large flocks around and across a barranca for an hour or more.

The complete success of our great outdoor flying cage for waders and swimmers, measuring 75 feet by 150 feet by 55 feet in height, prepared us for a similar result in large aviaries, protected by a roof of glass, which is provided with such generous ventilation that in summer the tenants have all the advantages of an out-of-door home.

As regards the difficulty of identification, I have found that most of the American public possess a large share of that curiosity which is so pronounced a characteristic of many of our more humble brethren of the earth. I have often seen people pass rapidly

by several cages, each of which contained a single species, giving but a glance at the label. But in the case of the great central cage of the new Bird House, where some 150 birds live happily together, running in and out of the miniature millet fields, and flying around the Norfolk and cabbage palms and cinnamon trees, the task of identifying some interesting member of the fifty-odd species offers itself as a fascinating game. Every species is carefully delineated in oils upon an individual descriptive label, so that the task is not difficult; and the result is, that considerable knowledge of several species of birds is gained. Seldom is a keeper appealed to for this information, and this objection to large aviaries seems *nil*.

C. W. B.

THE WHITE PEACOCKS

Three snow-white birds have recently been added to the collection of pea-fowl in the Zoological Park. Except in the Arctic regions, and among sea-birds, white birds and animals are very unusual, and it is among the herons and their allies that the majority is found.

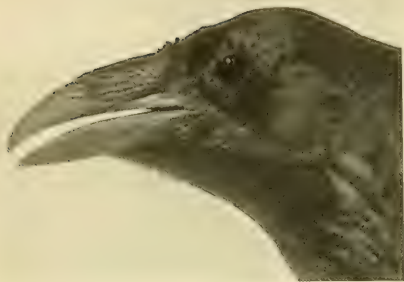
When albinism crops out in a creature of the forest or field, it is an immense disadvantage, the white feathers or fur being a brilliant target for the eye of every passing hawk or fox. So when we see such a bird as a snow-white peacock, beautifully perfect and immaculate as its plumage is, we may be almost certain that it is only an albinistic variety, brought about by artificial selection.

Among all domestic creatures, white is a common color, as in pigeons, fowls, horses and dogs, there being in these cases no danger of instant elimination of the abnormally colored.

Of all, however, it is most striking in a peacock, not only on account of its comparative rarity, but because we usually associate with the plumage of these birds all the colors of the spectrum, and when one of these birds spreads wide its train of purest white, the feeling comes that it is some shadow-bird—a spirit peacock—which is strutting before us.

C. W. B.

The attendance at the Aquarium during the month of August, was phenomenally large, aggregating 369,547, with daily average of 11,921. On Sunday, August 19th, 27,000 persons were recorded, and during the other Sundays of the same month, the attendance did not fall below 20,000.



AMERICAN RAVEN.

HOW BIRDS GET THEIR FOOD

By C. WILLIAM BEEBE

CURATOR OF BIRDS

IF we should tie a man's hands and arms tightly behind his back, stand him on his feet, and tell him that he must hereafter find and prepare his food, build his house, defend himself from his enemies and perform all the business of life in such a position, what a pitiable object he would present! Yet this is not unlike what birds have to do. Almost every form of vegetable and animal life is used as food by one or another of the species; birds have most intricately-built homes, and their methods of defense are to be numbered by the score; the care of their delicate plumage alone would seem to necessitate many and varied instruments; yet all this is made possible, and chiefly executed, by one small portion of the bird—its bill or beak.

If one will spend an afternoon at the New York Zoological Park (or with any good collection of live birds), watching the ways in which the bills of various species are used, one will not boast of his own accomplishments, when it is realized how much more, comparatively, the bird is able to achieve with the aid of two projecting pieces of horn.

More than a single volume could be filled with interesting facts about the bills of birds and the uses to which they are put—hardly any two species using their beaks in a similar manner. Our language is too often lacking in phrases expressing delicate shades of meaning, and thus we are compelled to identify structures among the creatures which rank below us, with portions of our own anatomy corresponding only in relative position or a general vague likeness of function. We are

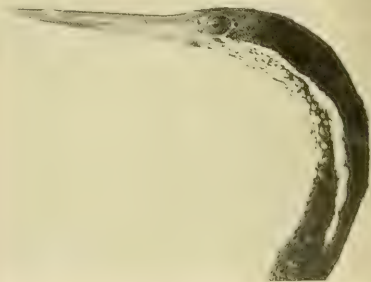
accustomed to speak of the *mouth* of a starfish, the *arms* of a sea-anemone, the *foot* of a snail: in these respective cases, structures specialized for receiving food or for progression being understood. But no one would think of alluding to a bird's lips or nose; both are included in the terms beak, or bill, and nostrils.

The finding and securing of food being the most important problem which birds have to solve for themselves, it is for these purposes, and especially the last-mentioned, that we find bills most adapted. This is so universally the case that we may often judge accurately of the kind of food of a certain bird from a glance at its bill.

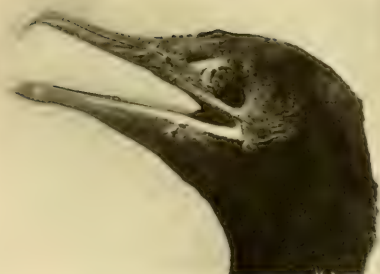
As is the case with so many other avian structures, the horny, toothless beak or bill is duplicated elsewhere in Nature only in a group of reptiles, the turtles and tortoises, whose mandibles furnish a splendid example of parallel evolution.

In certain of those long-extinct *Dinosaurs*, such as *Triceratops*, an interesting transitional condition is found. The front of the mouth was beak-like and horny, while farther back were the masticatory teeth.

Starting with the generalized beak of the *Archaeopteryx*, which was furnished with teeth, we are almost at a loss in which direction to turn, so many and so varied are the beaks of modern birds. No trace of teeth, however, is to be found in the adults of any of them. The bill of a crow or raven, and, to a lesser extent, that of his near relatives, the jay and the blackbird, is perhaps in shape most like that of the "bird of old," and is suited to the many purposes which the varied life of these intelligent birds requires.



SNAKEBIRD.



CORMORANT.

The crow or raven is an excellent example of a modern bird with a remarkably generalized diet, in striking contrast to those birds whose bills show them to be fitted for feeding only on some strictly defined food. With his strong, ample beak the crow can dig up recently planted corn, or crack the hard shells of acorns; he enjoys stealing the eggs and the young birds of thrushes, orioles, sparrows, warblers, and quail, and I have seen a crow chase, capture, and carry off a half-dozen wild mallard ducklings in one morning! These birds are, in addition, able to capture insects of all kinds, besides picking berries, and ducking their heads under water in quest of the shrimps which live in tide-pools. In short, their bill serves them well in procuring many kinds of food, from earth, water, or tree; as well as in carrying great quantities of sticks, which they use in the construction of their nests. These birds are so skilful with their beaks that a new trick is learned in a very short time. In captivity a crow, when it thinks no one is watching, will often take a morsel of food, thrust it beneath a piece of sod, and cover it up with grass, almost with one motion of the beak.

Functional or adaptive radiation is beautifully illustrated by the beak of a gannet, cormorant, snakebird, and pelican—birds which are closely related to one another structurally, also having in common a fish diet, swallowing their prey whole. The gannet's beak is thick and very strong, and along the inner edge is a series of fine serrations pointing backward. The bird dives, from a great height, into the water and seizes a fish in a grip of steel. The upper mandible of the cormorant is furnished with a large, sharp hook, with which the bird gaffs its prey, pursuing it under water. The snakebird, or

dartar, has a bill like a needle, with which it spears the fish, impaling it through and through; while the pelican, because of its great pouch least vicious of all in its methods, simply engulfs the fish, the water in which it is swimming and all, then, straining out the liquid, tosses the unfortunate into the air and swallows him head first. The rami of the under mandible of this bird are long and pliable and so arranged that they can bend far apart, thus making of the great bag of skin beneath the bill and throat an admirable fish-trap.

This is one of the many instances where several closely related species, with needs so similar that there is danger of fatal competition, are able to exist in great numbers and to avoid all undue struggle for existence by having each an individual method—a niche into which it fits perfectly in the great scheme of Earth's hungry creatures. The snakebird's prey is in the water of dense swamps and bayous; cormorants and pelicans amicably share inland lakes and tidal waters; while the haunt of the gannet is the high seas.

Even more closely related to each other are terns and black skimmers. Except in their bills these birds are almost identical in structure, but the bill makes a vast difference in the appearance of a bird, as is very apparent when these two species are seen flying about together on their breeding-grounds—low, sandy islands along our coast. The



BROWN PELICAN.



COMMON TERN.

small, delicately pointed beak of the tern finishes off its neat appearance, and the entire bird is the personification of grace, as it dashes through the air, or plunges headlong into the sea—to rise almost immediately with a small fish in its beak.

The beak of the skimmer lends a heavy aspect to the whole bird. It is long and high, and the lower mandible extends a full inch beyond the upper. Both are as thin and as pliable as paper-knives. A unique method of obtaining food is the secret of this apparent deformity: the strong wings of the bird enable it to fly very close to the surface of the water, so close in fact that the lower mandible dips below the surface, thus ploughing a zigzag furrow and catching up any organisms, shrimps or fish, which chance to be floating on the water.

Among ducks, we find those which feed on fish, and those which sift their food from the mud at the bottom of ponds, and these differ radically in respect to their beaks. The fish-eating merganser has perhaps, of all living birds, the nearest resemblance to a toothed beak. The deep serrations, however, are but indentations in the substance of the strong, narrow bill of the bird. When once in this saw-like grasp, the most slippery fish is helpless. The beak of the shoveller duck shows how well Nature has provided for its wants. The beak is arched and spatulate, while the sensitive epidermis is prolonged at the edges into a series of comb-like teeth—analogueous to the whalebone in the mouth of a whale. Through this sieve the water is drained out, leaving entangled the edible worms and insects.

If we should elevate our shoveller duck, placing him on long, slender legs and providing him with a correspondingly long neck,

he would indeed be in a predicament, since only the tip of his beak could be brought to bear in feeding. Now a flamingo is really a long-legged duck, which feeds in much the same way as the shoveller, and the difficulty mentioned is overcome in a most ingenious way. The mandibles are bent downward, almost at right angles, so that, when the head reaches the ground, not the tip but the whole inverted bill is in a position to sift out food. To meet the reversed condition, the lower mandible is deeply arched, instead of the upper, as in the shoveller duck.

We are able to follow the probable evolution of such remarkable beaks as those of the flamingo and skimmer by observing the growth of this organ in any individual from the time when the bird hatches from the egg until it is full-grown. In the very young flamingo chick there is no sign of the subsequent deflection, the mandible being short, perfectly straight, and rather slender. As the bird at first feeds upon regurgitated food, taking it drop by drop from the bill of the old bird, it, of course, has no need of the curved beak of its parents. Later, when its bill has increased in length and has begun to be marked by the ultimately sharp angle, the birds begin to sift from the coral mud the small mollusks of which their food consists.

Until its wings are full-feathered the young skimmer is compelled to limit its wanderings to the sand-dunes along the shore near its nest. Thus, although at birth the lower mandible is a trifle longer than the upper, yet even when the birds are half-grown the disparity in length between the two mandibles is but slight. Later, when the young bird is able to join its parents in their skimming of the seas, the lower mandible quickly attains its full development. The friction of the water upon the bill must be con-



BLACK SKIMMER



SPOONBILL



WHITE IBIS

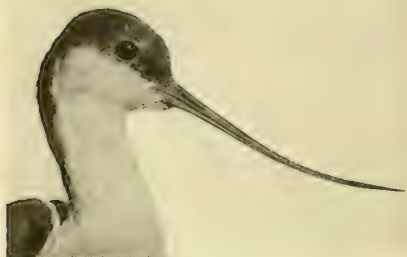
siderable, as in a skimmer which I have had for years in captivity, in the Zoological Park, the lower mandible grew remarkably fast, measuring six and three-fourths inches from base to tip when the bird was eighteen months old.

Hérons and ibises, through all the years, sought their food in much the same places as have ducks; the straight-billed herons seizing their living prey with a single lightning dart, as it swims past them; the spoonbills spattering in the shallows; and the curved-beaked ibises probing every crevice along shore. The spoonbills swing their necks and heads from side to side, as they walk slowly through the water, gleaning their food with the motion of a mower wielding his scythe. Two of the herons are interesting enough to hold our attention for a moment. The common black-crowned night heron is abundant throughout most of North America, and he fishes in legitimate heron fashion; but his near relative, the boat-billed heron, is a more tropical species. In voice, appearance, and structure there is little to choose between the two birds—except that the latter has a broad, scoop-like beak—a pelican's fish-trap in miniature, which seems to answer every requirement of this strange-looking bird. From the muddiness of the water in the tropical swamps from which I have flushed these birds, it seems probable that much of their food may be lesser fry than fish.

Pebbles and shells, which shelter so many toothsome morsels along the shallows of our seashore, offer sumptuous feasts to birds fur-

nished with beaks adapted to prying and probing, and we find all sorts of sizes and shapes. A collection of bills of various wading-birds would look like a complete set of surgical tools! There is the stilt, whose bill is almost straight; the ibis, with mandibles curved downward to probe the crevices between the pebbles on which he stands; the avocet has a pair of recurved pliers, which search out the worm or snail in the deepest fissures ahead of him. At the slightest touch of such a beak, the oysters and other large bivalves close with a snap, defying these birds to penetrate their living armor. Indeed, more than one gull or wader has rashly pecked at the sweet flesh, when the two tight-fitting doors have suddenly closed, pinning the bird helpless and holding it captive despite its struggles, until the rising tide has ended its life.

But along comes a bird, well named oyster-catcher, and woe to the mollusks now. It allows them to close tightly upon its bill, the mandibles of which are like thin blades, many years antedating man's oyster-knives. The mollusk is wrenched free by the sturdy bird, carried from the water still gripping the bird's bill, and is then pried open and eaten. The bill of this bird shows the wear and tear of forcing apart the shells, and it is sometimes slightly bent to one side. The short-billed gulls are denied the power of opening these oysters and mussels, but they sometimes get an unlawful feast by following up and robbing the oyster-catchers of the shells which the latter have opened.



AVOCET.



TOCO TOUCAN.

The bill of the shell-ibis of India may be likened to an ordinary lemon-squeezer, having a cavity in which the half-lemon rests before it is compressed. When the mandibles of this bird are closely opposed the central portion of the beak gapes slightly. In this cavity the bird firmly holds the shells of the land-snails upon which it feeds, until it can bring the pressure of both mandibles to bear and so crush the shell of the mollusk.

The asymmetry of the bill, as seen in the oyster-catcher, is not accidental, but constant, in the crooked-billed plover of New Zealand. In this bird the bill is permanently bent to the right, a beautiful adaptation to help the bird in its search for insects, which, in the dry country that it inhabits, are found almost entirely under stones.

As a rule, beaks are rather immovable throughout their length, but in the woodcock, and to a less extent in the dowitcher snipe, the extremity of the upper mandible can be raised some distance, as the cut shows. This extreme sensitiveness is especially necessary, as the eyes of the woodcock are placed very far back on the top of its head, and are of little or no use in seeking food.

What an interesting study the various beaks of land birds would offer, were we able to devote to them the space which they deserve! They defy classification and refuse to be arranged in any linear sequence. The majority of those birds which have their beaks armed with a strong hook feed upon living prey—from the great mandible of the golden eagle to the tiny vireo, which snaps up the dancing gnats.

The owls and the parrots, which, by the way, are much more closely related than most of our classifications would indicate, have bills very much alike, and afford a striking example

of two large related groups of birds whose diet has become radically unlike, although even in this case "blood will tell" and the kea parrot slips back into carnivorous habits with ease.

Owls tear their prey apart with their beaks, or swallow it entire, but parrots gnaw and gnaw upon their nuts and seeds, reducing their food to powder. This grinding and rasping is aided by several file-like ridges which many parrots have within their beaks. The hinging of the upper mandible with the skull is more evident in a parrot than in any other bird. This arrangement allows much freedom of motion.

It is not clearly known what use the immense beaks of toucans may serve, although there seems little excuse for this ignorance in those who know the birds in their native haunts. The delicate, spongy texture makes the clumsy-looking appendages exceedingly light, and they are usually banded or splashed with brilliant hues—blue, yellow, red, brown, green or black. But light as the beaks are in these birds, in the unrelated but similarly monstrous-beaked hornbills the weight must be considerable, for the first two vertebrae of the neck in these latter birds are fused together, to yield a firmer support for the muscles of the neck.

Chimney swifts and hummingbirds both feed upon insects and are rather closely related to each other, but here again the most decided difference is to be found in their bills. The broad, flattened mandibles of the swifts open wide, as the birds dash through the air, engulfing gnats and flies with wonderful skill: while the hummingbirds, as we all know, probe the deepest calyxes. Could two bills more unlike be imagined? In very young hummingbirds the bill is short and broad, very like the swift type, but later its long and slender shape is acquired rapidly: there are many resemblances

between hummingbirds and insects, due entirely to the similarity in their feeding habits. Certain flowers are especially adapted in structure to attract certain bees or moths, which in return unconsciously cross-fertilize the blossoms; and certain of the various bills of hummingbirds reflect the exact contour of the corollas in which the birds seek their food. Among hummingbirds the various shapes of bills of other groups are reproduced again. Humming through the air about us in the tropics speed miniature avocets, ibises, stilts, mergansers,

and we realize, as never before, the never-ending devices of Nature, providing for the needs of all, from the greatest to the least; endless patterns paralleling each other, but never identical. Indeed, in the great family of South American birds known as wood-hewers the diversity in shape, size, and direction of bills is so great that it seems as if not a niche, or crack, or hollow in the bark of any tree in the forest where these birds abound would afford a safe retreat to an insect!

It remains to mention the woodpecker's bill, which is used chisel-like for excavating his home as well as in boring for grubs. With his beak the nuthatch hammers his acorns, and the tailor-bird sews his nest. The thick conical beaks of all sparrows and finches are for cracking seeds; while the weaker, more slender beaks of warblers, thrushes, and wrens reflect a diet of insects. Among the finches is a group of several species which, by a thrust of the bill, have at their command a new source of food, one which there are none to dispute with them. Both mandibles of the crossbill are curved into sharp hooks which cross one another, either to right or left, thus forming a unique pair of pliers, with which the bird pries out the seeds shut tight behind the over-lapping scales of pine-cones.

The beak of a bird is always growing, and in captivity from lack of proper use, the mandibles sometimes grow to a great length, and, unless trimmed, will often interfere with the bird's feeding.



AMERICAN WOODPECKER.

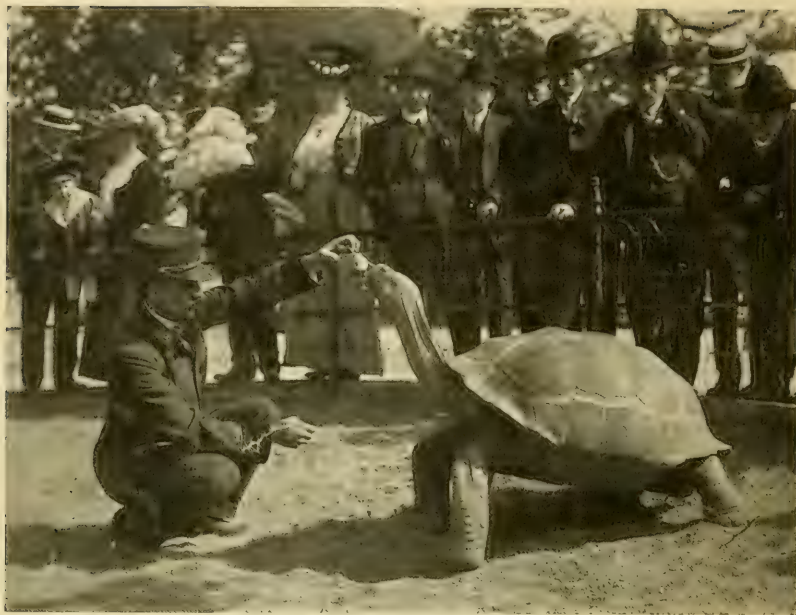
portions of the wood, and chisels out his prey, while the female with her long slender bill probes the holes in the sounder part, the hardness of which resists his weapon; or when he, having removed the decayed portion, is unable to reach the grub, the female comes to his aid and accomplishes what he has failed to do."

The bill of a bird, besides serving in so many other ways, is invaluable in preening the plumage, arranging disordered feathers, drying them, and, most important of all, in pressing out the oil from the gland on the lower back, and with it carefully dressing all the feathers, giving to them that brightness and gloss and also the water-proof quality—so surely a sign of perfect health in a bird. When, after the bath of a caged bird, you see the drops roll from its feathers, literally like "water off a duck's back," then the good health of the bird is certain.

The all-important use of the bill as a needle, shuttle, pick and shovel, auger and trowel in nest-building does not concern us here, nor does its function in expressing emotion, or in taking the place of the voice or of the foot. All this is expressive rather of the mental than the physical life of the bird.

Within a period of five minutes I have observed the following uses of the beak of a parrot perching in my study: With its mandibles it picked up a sunflower seed and comminuted it; it then hooked the upper mandible into a wire and swung itself along; gnawed at a hole it had begun to excavate; nibbled gently at my finger, showing affection; bit fiercely in anger

Perhaps the most remarkably adapted beaks in the world are those of the male and female Huia birds—natives of New Zealand—in which not only is the bill of the species designed for a special method of procuring food, but the bills of the two sexes are very different in form and use, and complement each other's methods. Concerning the peculiar use of the bill in the Huia birds, Professor Newton writes: "Its favorite food is the grub of a timber-boring beetle, and the male bird with his short stout bill attacks the more decayed



ONE OF THE LARGEST OF OUR TORTOISES.

The growth of this specimen has been so great, as to oppose the theory of the great age which these reptiles are supposed to attain.

and fear at a dead snake which I presented; preened several feathers of one wing, smoothing out all the dislodged barbs; rattled its beak along the wires to make a sound to attract my attention; and finally seized its water-pan and turned it over in pure playfulness.

The Aquarium has, for two months, had a good-sized specimen of the Tarpon (*Tarpon Atlanticus*), the first of the species ever exhibited there and probably the only one ever kept in captivity.

This tarpon, which is nearly five feet long, was taken on July 27, in a pound net at Belford, N. J., in the southern part of New York Bay. As soon as discovered in the net the Aquarium was notified and arrangements were at once made with the fishermen to have it brought to the Aquarium without delay. For more than a week it refused food, but at the end of the second week was feeding freely on several kinds of small, live fishes, and is now in good condition.

Another specimen of the tarpon, about six inches longer, was taken in the same locality and in the same way, on the following day. This specimen did not recover from injuries received during capture and died five days after being placed in the tank. It weighed just sixty pounds and was five feet and five inches in length.

The occurrence of the tarpon in New York Bay is noteworthy, as there appear to be only two or three other records of its appearance there. A specimen was taken at Gravesend Beach, New York Bay, in the summer of 1901. The species occurs as a straggler nearly every year along the south shore of Long Island and the south coast of Massachusetts. There does not appear to be any record of its capture on the New Jersey coast.

The tarpon may be considered as the king of game fishes. It is common in the Gulf of Mexico and is habitually taken by anglers at various points from Florida to Vera Cruz, Mexico.

C. H. T.





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